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Safety Color Code
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Some 2,000 Industrial concerns hold membership either directly or by group arrangement through their respective trade associations

Readers Write

American Standards in China

National Resources Commission of China

Gentlemen: We are very glad to learn that you have been successful in sending the complete set of your standards to our Department of Purchases & Stores in Chungking by air shipment. The set of standards will be kept in the library of the Department of Purchases & Stores. With this set of standards, work on the standardization of Chinese industries will be greatly facilitated.

H. Y. YUAN
Supply Department

Dr. Moss on Abbreviations

General Electric Company

Gentlemen: Your correspondent, Karl V. Amatneek, complains about international differences in the abbreviation for million and thousand. It is to be noted that Mr. Amatneek is talking about abbreviations such as are used in texts and tabulations. These are quite a different thing from letter symbols used in mathematical equations. The abbreviations as used in texts, which Mr. Amatneek talks about, to a large extent depend upon the language of the text as well as on deep-seated national customs. So attempts to arrive at international standards for abbreviations always have failed.

The International Electrotechnical Commission tried to standardize abbreviations but the United States National Commission pointed out the futility of this and nothing was done about it at the last IEC meeting in 1938 at Torquay. So M is a standard abbreviation for thousand in the ASA list, based on very wide current practice in use since the time of the Romans, and which the ASA Abbreviations Committee was well justified in following. It is unfortunate that M also may have some use in foreign countries and perhaps in radio for million. This is just one of a lot of difficulties in standardization of abbreviations and no one has found a way out. Luckily Ω is both an American and a foreign abbreviation for "ohm." However, in the United States, M Ω is the standard abbreviation for 1000 ohms. Proper American standard abbreviations for a million ohms would be meg Ω or 10^6 Ω.

It is to be remembered that *abbreviations* above mentioned are only for use in texts and always are preceded by a definite number. Thus we speak of a resistance of 80 M Ω or 80 meg Ω. But in a mathematical formula the *letter symbol* for resistance is R, and we have a mathematical equation, $E = IR$. Fortunately, the very important matter of international standardization of letter symbols is in good shape. At the IEC meeting at Torquay in 1938, some slight revisions were made in the IEC list of letter symbols and the resulting list, RM-174, is being arranged for international use.

Thus electrical engineers have an in-

ternational mathematical language. But in the reading matter of texts in different languages, in many cases, we may have to spell out words because international standardization of abbreviations has not been found possible. After all, this is not a very serious matter if the equations themselves do have an international meaning.

SANFORD A. MOSS
• Consulting Engineer
Supercharger Engineering Division

What About Shaft Diameters

National Automatic Tool Company, Inc.

Gentlemen: We are attempting to set up standards on certain parts and are having a little trouble in finding just what work, if any, has been done along these same lines by other companies.

For example, we would like to set up standards on the following items:

1. Shaft diameters
2. Bearing diameters
3. Bearing bores and outside diameters
4. Oil seal O.D., I.D., and lengths
5. Lock-nut threads

Will you please advise us if you have developed any standards for these items.

HERMAN GRANBERRY
Engineering Coordinator

. . Standards for shaft diameters have not been set up as yet in any approved American Standard. However, a series of Preferred Basic Sizes for holes and shafts is given in Table I of the proposed American War Standard, Limits and Fits for Engineering and Manufacturing, B4.1/8, February 5, 1945. This table was set up for the chief purpose of reducing the excessive variety of nominal hole sizes now being used in industry (one company has reported the use of approximately 1600 different hole sizes up to 1½ in.), thus reducing the number of tools and gages required for production and inspection.

Photographic Speed Numbers

Eastern Signal Corps Training Center, Fort Monmouth, N. J.

Gentlemen: We have your letter of June fourth granting us permission to duplicate the Log Exposure Graph, figure 1, page 7, American Standard Method for Determining Speed and Speed Number Z38.2.1-1943, in the War Department technical manual, TM 11-752.

HERRICK S. ROTH
Captain, Signal Corps

The Front Cover

There is no danger of an employee not seeing this fork lift truck, painted according to the Color Safety Code, as it rolls about its business of moving materials at the Richmond Army Service Forces Depot. Other color code features are the line at the edge of the platform and the yellow edge on the gangboard. The "No Smoking" sign may be red with white letters; green with white letters; or white with black letters, as shown here.

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August, 1945 Ruth E. Mason, Editor 35 Cents

Standardization is dynamic, not static. It means not to stand still, but to move forward together.

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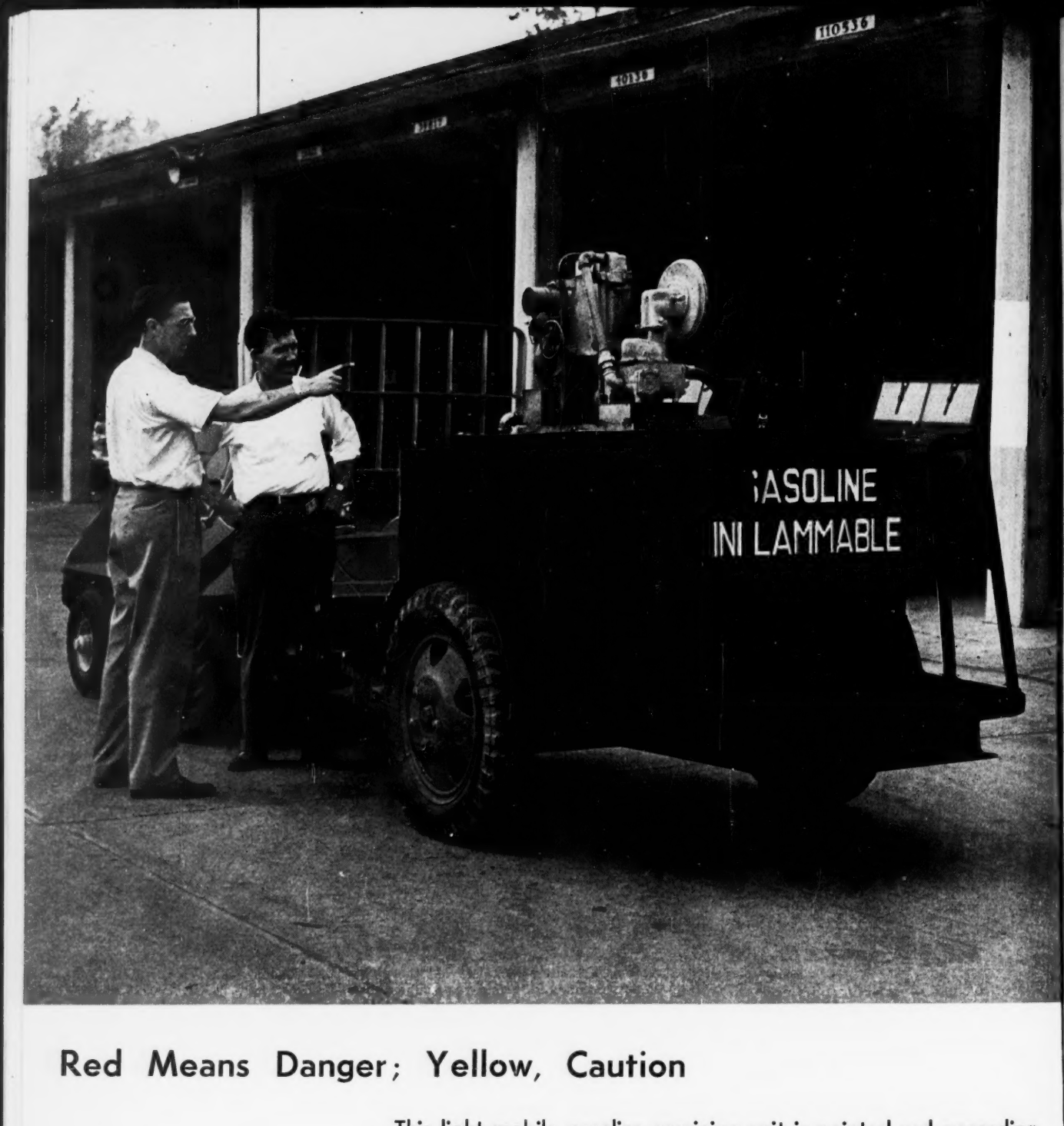


Red Means Danger; Yellow, Caution

This light mobile gasoline servicing unit is painted red according to the provisions of the American War Standard Safety Color Code. It is one of four such units used to service the 274 tractors and fork lift trucks handling material at the Richmond Army Service Forces Depot. Here, O. P. McCauley, left, Depot Safety Engineer, is pointing out to Everett G. Lacy, inventor of the unit, how the unit is painted in colors to comply with the code.

(For a description of how the Army Service Forces Depot at Richmond, Va., has used the color code, see Page 171.)

Standard Colors = Quick Action *Result:* Greater Safety in Industry

By J. E. Long

New American War Standard codifies easily recognized colors to identify danger points and safety equipment

A BIT of red rag tied to the protruding planks of a load of lumber, red lanterns to mark an excavation, the yellow line to mark the edge of a loading platform, the black and yellow checkers on a low overhang—all these make it possible for any person to know that a sign indicates danger, caution, or safety as the case may be, even though he may be unable to read in the language used on the sign. All of these, in a sense, have paved the way for an over-all color safety code that has just been completed by a war committee of the American Standards Association.

Color schemes for the identification and location of fire extinguishers, first aid kits, traffic aisleways, stumbling and tripping hazards, etc, have been developed in the past by a large number of industrial plants. The paint manufacturers in particular have pioneered in use of color as a safety aid. Generally speaking, the standards arrived at in individual cases have given satisfaction to those using them. They suffer, however, from lack of uniformity among plants or organizations. As a result of these conditions, spontaneity of action in time of emergency is lost, particularly by employees who have moved from one plant to another which has a different system. This means that a new employee is likely to spend the first 30 seconds after a fire has started, which is agreed to be the most critical period in fire fighting, searching for an extinguisher, the location of which is marked differently from the way it was in the last place where he worked.

The Army, as well as industry, has made wide use of color in its accident prevention program. The Quartermaster Department in particular has a serious problem. Depots are scattered all over the country, moving and storing huge quantities of everything that the Army needs; and fires or accidents in these establishments may hold up vital shipments to the fighting fronts. Yet the personnel of these depots is relatively untrained and soldiers are frequently shifted from one depot to another.

J. E. Long, *Superintendent of Safety, Delaware and Hudson Railroad, is chairman of the ASA War Committee on the Safety Color Code.*

Last June, the War Department requested the American Standards Association to unify on a national scale the various color markings used to warn employees of danger, to mark the location of safety equipment, and to indicate fire fighting and other protective equipment.

The ASA was asked to do the job because it has already had wide experience in this type of work, having completed 88 standards of direct concern to the war effort. The ASA called together a committee on which industry was widely represented, as well as the Army and Navy, and in September this committee set to work to draft the standard. Its chief task has been one of unifying on a national scale what has already been done, so that the meaning assigned to a color will be the same to employees of a garage in New York as to the workers in a boiler factory in Toledo, Ohio.

Since too many color identifications constantly in the field of vision of the employee are both confusing and fatiguing, the committee tried to limit its recommendations to keep the code simple. Every location of a colored marker was studied carefully in order to keep the number of markings at a minimum, thereby providing even greater emphasis for the markings finally adopted and used. The committee also had to take into consideration psychological reactions to color—for example, the association of red with danger, and the long use of red for fire extinguishers, and

The Color Code in an industrial plant
Note white traffic lines as well as yellow truck and trailers

other fire-fighting equipment, both of which uses are deeply imbedded in the public consciousness.

Since it was agreed that the code should not be in conflict with any accepted regulations on use of color or shape of markers in sea or air navigation or in highway and railroad transportation, the committee has included references to standards already in effect on these subjects; for example, it has referred to the American Standard Color Code for Traffic Lights. It has also taken into consideration such American Standards as the Code for the Identification of Piping Systems which uses color to identify various classes of materials flowing in pipes. Another color code, approved by the American Standards Association in 1930, identifies gas mask canisters. Here various colors and combinations of colors have been assigned to the different types of gases against which the masks afford protection. In 1941, an American Standard was approved which provides Specifications for Industrial Accident Prevention Signs and this standard, in addition to specifying the shape and general layout of these signs, makes definite recommendations concerning the color for each type of sign. Red is specified for danger signs, yellow for caution, and green for safety. Black and white are specified for directional signs.

By February of this year, the committee had a draft standard which it realized was not perfect, but which it felt was good enough to circulate to industry for comments and suggestions. The Army painted one of its Quartermaster Depots in accordance with the draft standard in order to test it out; and many manufacturers sent in helpful comments which were later used in revision of the draft standard.

Codifies Widely Recognized Concept

Briefly, the standard is a codification of certain already widely recognized concepts regarding use of color for safety purposes.

Red is indicated (1) for the identification of fire protection equipment and apparatus, (2) for danger, (3) for "stop" signs.

Yellow is indicated for caution, and for marking physical hazards; such as striking against, stumbling, falling, tripping, etc.

Green is indicated for safety and for location of first aid equipment.

White, Black, or a combination of the two, for housekeeping, and traffic markings.

The War Committee which prepared the American War Standard Safety Color Code brought together individual experts on safety problems from important industries as well as from different branches of the Army and Navy. All have been vitally concerned with efficient production for the war.

The members of the committee are:

John E. Long, Delaware and Hudson Railroad Corporation, *Chairman*

Clinton B. Allen, War Department, Quartermaster Corps
R. P. Blake, Division of Labor Standards, U.S. Department of Labor
Donald Cameron, Liberty Mutual Insurance Company
Major William J. Crabbs, War Department, Transportation Corps (Capt Albert H. Cientat, Alternate)
Lt Col George R. Ensminger, War Department, Ordnance Department
M. C. Goodspeed, General Electric Company
Lt Col E. R. Granniss, War Department, Provost Marshal General's Office (Major Eliot V. Parker and Capt Victor H. Anderson, Alternates)
Louis Hollander, N. Y. State Industrial Union Council
Walter T. Johnson, American Airlines, Inc
Harry J. Keegan, National Bureau of Standards, U.S. Department of Commerce
G. H. Lamm, Hudson American Corporation
Col A. J. Lanza, War Department, Medical Department
J. Willard Lord, The Atlantic Refining Company
J. A. Meacham, Sherwin-Williams Company
Harold L. Miner, E. I. duPont de Nemours & Co, Inc
Walter H. Morley, War Department, Corps of Engineers
Walter S. Paine, Aetna Casualty and Surety Company
Comdr Forrest I. Phippeny, U.S. Coast Guard
Lt Col James C. Sawders, War Department, Chemical Warfare Service
Capt C. M. Simmers (Ret), Shore Establishments Division, U.S. Navy (Edward B. Landry, Alternate)
Capt H. Ledyard Towle, Pittsburgh Plate Glass Company
Lt James T. Trollinger, War Department, Army Air Forces*
G. Fred Walter, Public Service Electric & Gas Company (C. M. Mosher, Alternate)
H. G. Lamb, ASA staff, served as secretary for the committee.

* Since completion of the voting Lt Francis G. Marong has replaced Lt Trollinger as the representative of the War Department for the Army Air Forces.

The American War Standard Safety Color Code for Marking Physical Hazards and the Identification of Certain Equipment, Z53.1-1945, can be obtained from the American Standards Association at 25 cents.

Much of the standard deals with suggested applications for these colors, such as the markings of safety cans, fire sirens, posts, hand rails, unguarded edges of platforms, location of gas masks, stretchers, etc. The code frequently refers to standards already approved.

One of the committee's big headaches was a controversy over whether to use white or yellow for traffic markers inside plants. The committee felt that since most paint manufacturers are already producing a special paint known as "traffic marker white," and since white has been accepted for highway traffic and stands out better than yellow in dimly lighted areas, they would continue to recommend white for traffic markings inside plants.

Many comments were received concerning the question of what color to paint the specially protected containers used to store or dispense small amounts of gasoline and other highly flammable liquids. Such containers (called safety cans) have been painted red by custom, and this custom is even incorporated into some municipal regulations. The committee decided that such cans should continue to be painted red; but in light of the comments, it also provided for "some additional clearly visible identification either in the form of a yellow band, or the name of the contents stencilled on the can."

Other suggestions had reference to the wide uses given to *red*, the feeling being that this might lead to confusion between the marking of fire protection equipment and dangerous liquids. *Orange* was suggested instead of *red* to indicate danger. While the committee felt that there was much merit in this suggestion, they did not adopt it because in the mind of the average person "red" not "orange" is the color identified with danger. There was also grave doubt as to whether in a sudden

emergency "orange" could be differentiated from "red," since there is only one intermediate stage of color between red and yellow, although there are wide intermediate stages between blue and yellow or between green and yellow.

Some of the code's recommendations may not appear to be entirely rational at first glance. For instance *red* is used to paint fire equipment, although fire extinguishers, fire buckets, etc, are essentially safety devices. The same color is used to indicate danger. These two uses are not as diametrically opposed as they would seem, if you remember that red was first used to identify fire protective equipment from a "Hands Off" or "Let Alone" standpoint. Sprinkler and standpipe piping, fire pails, and other fire fighting facilities are painted red to indicate that they must not be used for ordinary purposes, or that they should always be maintained ready for use in case of danger.

All criticisms and suggestions turned over to the committee will be kept for further consideration when a peacetime project that has already been requested gets under way, and picks up the work at the point where the ASA War Committee left off. The present work of the War Committee was influenced by the need for a standard immediately that would save lives and property.

Next job being worked upon is to define the colors recommended by the standard. This is being left to a subcommittee which is already at work under the chairmanship of Harry J. Keegan of the National Bureau of Standards. This is important because of the incidence of color blindness. Most color-blind persons can distinguish between certain shades of red and green. Therefore, the subcommittee must not only choose colors that are vivid enough to catch the eye of the normal person, but ones that are also distinguishable to the largest percentage of color-blind persons. From a technical point of view there will eventually have to be at least three sets of technical color specifications—one for colored lights, a second for glossy paints, and a third for mat paints. This latter specification would probably serve equally well for textiles. The committee's first concern is with reflected light—chiefly glossy paints.[1]

Neither the War Department nor industry intends that color markings shall become a substitute for adequate guards or other safety measures, but to supplement them. In fact, a warning is written into the standard that "the marking of a physical hazard by a standard color warning should never be accepted as a substitute for the complete elimination of the hazard wherever this is possible."

The standard, while not a perfect document, represents a definite step forward, made possible by the fine cooperation of industry with the Armed Forces in this work. As a war standard, it will be subject to thorough review before being accepted as an American Standard after the war. Meanwhile, it is being put to use to save lives and valuable property.

[1] The color specifications, when completed, will be in agreement with the American War Standard Specification and Description of Color, Z44-1942.

How an Army Service Forces Depot Uses the New Safety Color Code

THE need for uniformity of color in markings for safety became evident at the Richmond Army Service Forces Depot, Richmond, Virginia, commanded by Colonel O. W. Humphries, soon after this huge Army supply installation was activated early in 1942. Nineteen large warehouses, two open sheds, and vast open storage areas are used for the storage and distribution of Quartermaster, Engineer, and Medical supplies at the Richmond depot.

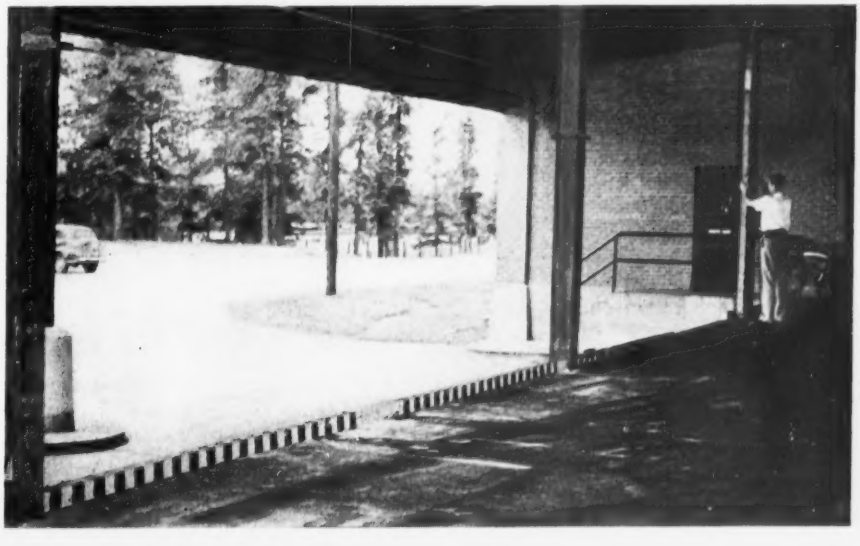
During 1944, alone, RASFD moved close to 1½ million tons of supplies which range in size from the fine needles used by the Medical Technical Sections to the huge rock-crushing machines that the Engineers use in building bridges and airfields. This tremendous supply job was accomplished only because materials-handling equipment was used.

In use at the Richmond depot are 184 fork lift trucks of from 1000 to 6000 pounds capacity. More than 2300 four-wheeled warehouse trailers are drawn by 90 tractors of various sizes. Add to this 30 motor scooters and 115 bicycles operating through the warehouses and open storage areas, and one gets some idea of the traffic problem confronting the Safety Engineer.

One of the first steps toward the uniform use of color and markings was to mark off aisles in the warehouses which have two main boulevard aisles and numerous lateral fire aisles. This proved a very satisfactory aid in the control of traffic and in storage operations.

When O. P. McCauley, the Depot Safety Engineer, studied his acciden-

To prevent equipment, parked at the edge of truck platforms for servicing, from rolling off the platforms, this guard rail was devised. However, workmen often failed to raise it out of the way when loading and unloading until they had stumbled over it. The application of the black and "high visibility yellow" herring-bone stripes eliminated the stumbling hazard and made the safety device workable.



tal injury records, one of the danger signals that was flashed to him by the figures was the large number of employees who walked into the warehouse trailers, "barking" their shins. Due to the great volume of materials stored, often every square inch of available storage space was used, making it essential to park the trailers in the aisles, admittedly an unsafe act. Further study of the injury reports divulged that these accidents occurred when the warehouses were not fully lighted and during the quitting time exodus from the buildings.

As it was impossible to keep the warehouses fully lighted throughout at all times, the obvious answer was to increase the visibility of the trailers, which were painted black. This was done by painting the edges of the trailers with four-inch black and "high visibility yellow" stripes and the couplings solid yellow. The epidemic of sore shins almost entirely disappeared.

When one of the fork lift trucks rolled from a truck platform where the materials-handling equipment was parked for servicing, the Safety Engineer came into the picture again. Several remedial measures were tried without much success. Meanwhile more trucks rolled off. Study showed that these accidents occurred only at the platforms where the equipment was serviced. A hinged guard was devised that could be raised to a vertical position out of the way when the platform was being used for loading. The only trouble was that too often workmen, when preparing to load or unload trucks at the platform, forgot to raise the guard rail until after they had stumbled over it. Again the four-inch black and "high visibility yellow" stripes saved the day. The guard rails no longer presented a problem after painting. A safety device which had turned out to be a hazard was thus made workable by use of the color marking.

At all points on the Richmond Army Service Forces Depot where guy wires constitute a hazard to pedestrians or mounted patrolmen, the guards are painted as shown here.

Next came black and yellow angle corner boards placed at aisle corners in warehouses, which practically eliminated the waste of material caused by materials-handling equipment striking the corners of stacks in making turns. Tripping hazards, fork lift trucks and tractors, guard rails, the edges of rail platforms, and other hazards followed.

In the early days of the depot, before the employment of a Safety Engineer, the various divisions recognized the need for making fire extinguishers and other fire protective equipment stand out. Some employed a background of white paint, some red, yellow, and even green. Again the Safety Color Code came into the limelight. All fire protective equipment is unformly painted "fire protection red" with the exception of such items as fire extinguishers in which case the standard red background is used. Fire hydrants which constitute a traffic hazard are painted with a red bonnet and black and yellow striped barrel.

Rigid metal flags painted "precaution blue" are used to protect locomotives while laid up for repairs and railroad cars while being unloaded. Railroad crossing and traffic signs are standard black on yellow, universal sign shapes being used.

That there has never been a motor vehicle-pedestrian accident at the depot can, to a large extent, be attributed to the use of pedestrian crosswalk lines at all danger points where pedestrian traffic is heavy.

"Safety green" is not used extensively at the RASFD except on safety bulletin boards and signs of a special nature. First aid kits, cabinets, and stretchers are not used. The depot is equipped with two ambulances which are on call 24 hours per day and a central dispensary, where all injuries are treated, is also in operation round-the-clock.

Want Methods Simplified for Estimating Paper Weights

Advertisers, printers, publishers, and other large paper users, as well as the manufacturers of paper and paperboard, are overwhelmingly in favor of simplifying the present cumbersome and archaic method of measuring paper and paperboard, according to a nation-wide poll conducted by the Bulkley, Dunton Organization.

Less than one-third of one percent of the 1,500 paper users and only one percent of the 700 manufacturers questioned have indicated that they are opposed. Negative votes in some cases were caused by apparent lack of understanding of the proposed uniform standard base, it was reported. The proposed simplification does not affect present sizes and weights of paper and paperboard.

ASTM Standards on Rubber Goods

The special 1944-1945 compilation of ASTM standards covering rubber products and related materials includes 75 specifications and tests. Some 160 pages are devoted to general methods of testing rubber products including chemical analysis, sample preparation for physical testing, tension testing, accelerated aging, state of cure, adhesion, hardness, changes in liquids, and brittleness. Many other properties are covered.

Test methods for specific rubber products, and specifications for them, are compiled together, covering rubber hose and belting; rubber gloves, matting, tape; rubber-coated fabrics; insulated wire and cable; hard rubber and cellular rubber; rubber cements and latices; packing materials; and nonrigid plastics. The book also includes electrical tests and a series of definitions of terms.

Several emergency requirements applying to standards for rubber products are given. These have been widely used during the war period.

Copies of the book in heavy paper cover can be obtained from the American Society for Testing Materials, 260 South Broad Street, Philadelphia 2, Pa., at $2.75 per copy, reduced prices on orders in quantity.

How Strong Is a "Safe" Building?

By George N. Thompson

Chairman, ASA Sectional Committee on Building Code Requirements for Minimum Design Loads in Buildings; Chief, Division of Codes and Specifications, National Bureau of Standards

New standard in the series of American Standard Building Codes gives designers data on how to determine the minimum loads a building can carry with safety

WITH the approval by the Standards Council of American Standard Building Code Requirements for Minimum Design Loads in Buildings and Other Structures, A58.1-1945, another step has been taken in the program of preparing a complete series of related standards in the building code field.

Sponsorship of this project was undertaken by the National Bureau of Standards and the sectional committee was organized as one of non-commercial character, since it was felt that the loads to be determined as a basis for design were of general application. The committee was divided into four subcommittees, each of which developed recommendations in its particular field and the reports of these committees were subsequently combined into the finished standard. The subcommittees dealt with the subjects of dead loads, loads caused by occupancy, wind loads, and earthquake loads.

Tables Show Weights of Materials Used in Building Construction

In the case of dead loads, rather extensive tables have been presented showing weights of many materials used in building construction. The subcommittee, at first headed by William L. Gompert, architect, of New York City, who was obliged to withdraw from the work because of press of other duties, obtained much of its information from the Office of the Supervising Architect, Public Buildings Administration, which had accumulated a large amount of information on the subject in the course of its work. Values were checked at the National Bureau of Standards and by other agencies. In some cases, variations in weight for the same materials have been presented showing a considerable range.

The work of the subcommittee on loads caused by occupancy developed information of special interest. Conventional methods of providing for reduction of live load on columns and other structural members in recognition of the fact that all areas are not likely to be uniformly loaded were examined critically, and several approaches were made to the development of a rational formula. Eventually, this led to the determination of the actual loads in a number of buildings through actual weighing of their contents.

The survey thus made was done under the direction of Charles W. Barber, Chief Structural Engineer, Public Buildings Administration, and was in immediate charge of John W. Dunham of that organization.

As a result of the work done, a method of reduction was developed which received the approval of the entire committee and was incorporated in the standard.

Essentially, it consists of starting with a basic live load equal to the maximum to be allowed on any panel and a rapid reduction to a minimum load based upon the relation of live and dead loads, in such a manner that overstress on any member due to full basic load throughout the structure cannot exceed a predetermined value. Moreover, the system is such that only a very small portion of the structure will be overstressed by the probable actual live loads. Provision is made for the condition that certain occupancies, such as the orchestra floors and balconies of theaters and storage buildings, may be fully loaded throughout.

In the case of wind loads, another significant development is the inclusion of requirements for assumed pressures acting outward on walls and roofs. The great majority of existing building codes contain provisions that are concerned only with

How strong must designers make floors and walls in factories, office buildings, and theaters to prevent them from collapsing when occupied by the machinery, desks, or enthusiastic audiences which they may have to accommodate? Is it necessary in any particular location to provide especially strong construction to resist wind pressures, to withstand earthquake shocks, and to prevent collapse of roofs under the load of winter snow?

These are questions that can now be answered through the use of the new American Standard Building Code Requirements for Minimum Design Loads in Buildings and Other Structures, just completed under the procedure of the American Standards Association, with the National Bureau of Standards as sponsor.

An old problem that was solved very simply in Babylon more than two thousand years before Christ has been given a more modern treatment in this standard. King Hammurabi decreed that: "If a builder has built a house for a man and his work is not strong, and if the house he has built falls in and kills the householder, that builder shall be slain." The sectional committee gives specific minimum values to assume for weights of materials and occupants, and so provides definite information where the ancient builder was left to his own devices.

Many building codes ignore the fact that wind pressure can act outward as well as inward. This so-called negative pressure accounts for many things that happen to buildings in severe windstorms, including the familiar sudden departure of the roof and the bulging of walls. The committee's recommendations also take into account the effect of the height of the structure, its shape, and other considerations.

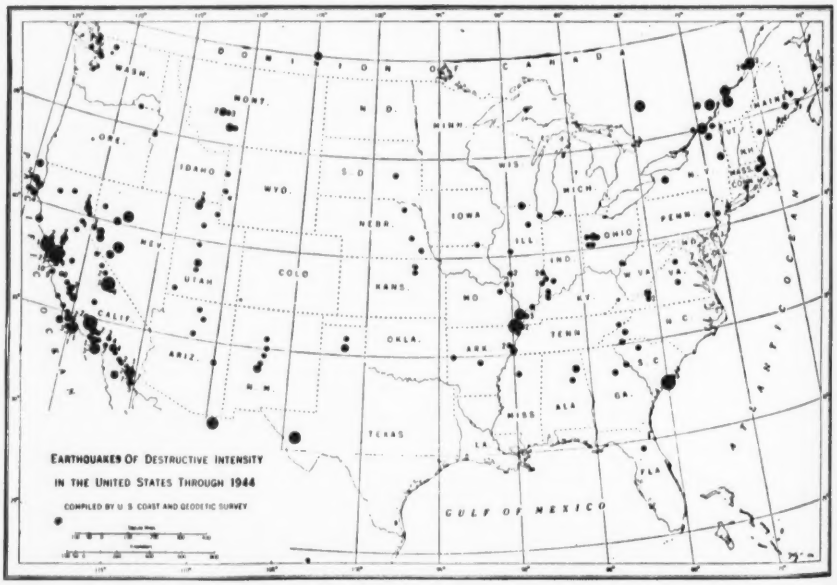
wind pressures acting inwardly normal to the surface. The lessons of experience, involving roofs lifted from their supports, point to a quite different condition. The subcommittee made full use of the successive reports of Subcommittee 31 of the Committee on Steel of the Structural Division, American Society of Civil Engineers, which have laid the foundation for extensive research in this field. Under the chairmanship of Dr. H. L. Dryden, Chief of the Division of Mechanics and Sound of the National Bureau of Standards, requirements have been developed that should make it possible for local building code committees to provide for wind pressures in a more scientific manner than has been done before.

The subcommittee dealing with earthquake loads had as its chairman Mr. Henry D. Dewell, Consulting Engineer, San Francisco, California. It has suggested two sets of requirements, one for general use in view of the fact that no region in this country apparently can claim complete immunity from possible earthquake shocks and the other for regions where such shocks have been of considerable severity. Values for suitable coefficients to be used in design in each case are presented, accompanied by provisions for design intended to provide reasonable assurance of safe and economical construction.

As in some other standards in the building code series, it has been thought proper to provide an Appendix which is not part of the requirements but which should be helpful in applying the provisions of the standard. It consists of supplementary and explanatory material and includes a number of illustrations.

Map Shows Where Heavy Snow May Be Expected

In the case of snow loads, for instance, a map is presented in the Appendix showing the probable distribution of such loads in different parts of the country. This is based on U. S. Weather Bureau records and serves as a reminder to local committees that the minimum values given in the standard may need to be adjusted in accordance with local conditions. Similarly, a map showing wind pressures in different parts of the country is shown, together with information intended to assist local committees in determining just what values they should use in their own codes. This method of providing for necessary local adjustments is believed to add to the value of the standard. A third map in the Appendix, supplied by the U. S. Coast and Geodetic Survey, shows the location of the more important earthquakes that have occurred in this country over a period of years and again provides local committees with a factual basis upon which they can reach decisions as to what should be done in applying requirements for construction to resist earthquakes.



Earthquakes of great magnitude strike in places where little thought is given to the possibility of their occurring.

At New Madrid, Mo., in 1811, the greatest U.S. earthquake of historical times occurred. Charleston, S.C., suffered severely in 1886. More recent earthquakes show a wide distribution over the country. The committee calls attention to this by means of a map showing occurrence of destructive earthquakes and the dollar value of damage.

The new American Standard Building Code Requirements for Minimum Design Loads in Buildings and Other Structures is one of a series of standards presenting recommended basic building code requirements. Standards already completed in the series include building requirements for masonry, grandstands, reinforced gypsum concrete, and administrative requirements.

The work on minimum design loads was done by subcommittees under the general direction of a sectional committee on which were represented important organizations directly concerned with the design of buildings. The National Bureau of Standards is sponsor. Members of the sectional committee are:

George N. Thompson, Chief, Division of Codes and Specifications, National Bureau of Standards, *Chairman*

American Institute of Architects, *Levon Seron; Theodore I. Coe (Alternate)*
American Society of Civil Engineers, *James L. Edwards*
Building Officials Conference of America, *William D. Guion; James A. Easton (Alternate)*
Federal Works Agency, Public Buildings Administration, *Charles W. Barber*
National Association of Real Estate Boards, *K. Lee Hyder*
National Housing Agency, *Ralph R. Britton; A. M. Korsmo (Alternate); F. W. Milliken*
Pacific Coast Building Officials Conference, *Hal Colling*
U.S. Department of Commerce, Coast and Geodetic Survey, *Frank Neumann*
U.S. Department of Commerce, National Bureau of Standards, *George N. Thompson*
U.S. War Department, *Col L. E. Urquhart*
Members-at-Large, *Joseph W. Degen; Henry D. Dewell; Hugh L. Dryden; R. R. Martel; David Lee Narver; Arthur C. Ruge; C. A. Wilson*

Walker S. Lee, vice-chairman of the ASA Building Code Correlating Committee, and J. H. Courtney, technical secretary, serve as ex-officio members of the Sectional Committee on Building Code Requirements for Minimum Design Loads in order to coordinate the requirements of the standard with others in the building code program. Mr. Courtney, member of the staff of the American Standards Association, is secretary of the sectional committee.

Copies of the American Standard Building Code Requirements for Minimum Design Loads in Buildings, A58.1-1945, in the uniform building code format, are available from the American Standards Association at 50 cents. Copies are also available in a government format from the National Bureau of Standards, sponsor.

American Standards Association Broadens Scope for Postwar Work

Changes in the Constitution of the American Standards Association that will enable it to meet more fully the needs of government and industry in the postwar period have just been completed. The national trade, technical, and governmental groups that make up the American Standards Association have ratified these changes, the principal one of which will remove present restrictions limiting the work of ASA "to those fields in which engineering methods apply." As a result, the ASA can in future handle any standard or standardization project in the field of engineering or consumer goods or in any other field that deserves national recognition.

Another change provides for specific mention of the consensus principle in the Constitution. This principle—that all groups with an interest in a particular standard have a right to a voice in its development—has always been basic in ASA operations. It seemed wise to place additional emphasis upon it by incorporating it in the Constitution, thus assuring cooperating bodies that the work will be carried out in accordance with their desires.

A third change provides for election to the Board of Directors of three members-at-large. At present all but the ex-officio members of the Board are nominated in rotation by the Member-Bodies. The additional members-at-large will make it possible to enlist the services of outstanding persons from groups not otherwise represented, thus making the board still more broadly representative.

In making these changes in the Constitution of the American Standards Association, the national trade, technical, and governmental groups that constitute its basic membership restated their belief that the central force of the standization movement should continue to spring from the organized industrial, professional, and consumer groups with the full cooperation of the governmental agencies concerned.

Illuminating Society Recommends Lighting Practice for Homes

The first official Recommended Practice of Home Lighting has recently been released by the Illuminating Engineering Society. Developed and prepared by the Society's Committee on Residence Lighting, the illustrated booklet is a guide for the lighting of all of the major rooms and various seeing tasks in the home. Its recommendations are based on the findings of home lighting specialists of many years' experience and represent the most comprehensive and official study of this subject heretofore published, the IES announces. In addition to the fundamentals of adequate lighting, the report covers such subjects as color and its relation to light, fluorescent and filament sources in the home, built-in lighting, placement of lamps, and includes also a table of foot-candle recommendations for numerous seeing tasks in the home.

Each room in the home is studied separately, and specific recommendations are made for its lighting, including drawings of suggested light-fixture types. Thirty-six illustrations included in the booklet graphically demonstrate the seeing conditions achieved by these lighting recommendations.

It is expected that the IES Recommended Practice of Home Lighting will be of especial value to architects, interior designers and decorators, home economists, and many others interested in the welfare and comfort of the American family, the Society states.

The booklet is available from the Illuminating Engineering Society, 51 Madison Ave., New York 10, N. Y.

Serious Accidents Lead to Tests For Flammability of Textiles

By Dr. Frederic Bonnet

National and state laws will control sale of "flammable" textiles; new tests will be standardized to determine which textiles are combustible and dangerous to the wearer

ON January 27, 1945 the California Legislature passed a bill governing the sale of flammable or "explosive" fabrics which read: "It is unlawful to manufacture, sell or offer for sale—any article of wearing apparel, cloth, drapery, or other fabric or material made from or containing any synthetic fiber which is wholly or in part made from or contains any hazardous explosive or other substance in sufficient quantity so as to make such fabric or material more highly inflammable than cotton cloth in its natural state." The law went further to include "any toy, tool, or other article designed for use or intended to be used in any household or place of abode, containing such hazardous or highly inflammable substance." Making the flammability depend upon a comparison with "cotton in its natural state" left the interpretation as to what fabrics are to be considered flammable vague and uncertain, and the law unenforceable.

On March 6 the California State Fire Marshal, Mr. Joe T. Yockers, tentatively offered the following suggestions for amending the law:

"It shall be unlawful to manufacture, sell or offer for sale in this state any of the following:

"(*a*) Any garment or wearing apparel made from or containing any cellulose nitrate product.

"(*b*) Any garment or wearing apparel made from a fabric or textile that will flash, ignite or blaze within one minute when placed over an electrical element that is adjusted to generate a temperature of 400 F at a point one inch above the element.

"(*c*) Any garment or wearing apparel made from synthetic fibers or textiles and having a pile or brushed surface unless such fabrics or textiles have been treated with an effective flame retardent solution, and are plainly marked with a warning label indicating the flammable nature of the fabric, the fact that the garment has been treated with a flame retardent chemical and minimum life of the flame retardent treatment when subjected to laundering and cleaning.

"(*d*) Any buttons, decorative pins, emblems, brooches or other similar ornaments of personal adornment whatsoever that are made from or contain any celluloid or cellulose nitrate substance or material.

"(*e*) Any children's toys or play things made from or containing any celluloid or cellulose nitrate substance and material.

"(*f*) Any dolls, stuffed animals or similar articles made from or containing any of the materials or substances mentioned above which might be easily ignited and thereby contribute to the bodily injury of a child."

It is quite obvious that the Fire Marshal's suggested revision of the bill was more specifically pointed toward celluloid and cellulose nitrate materials rather than toward "synthetic" fibers. However, he did include certain types of "synthetic" fabrics which were a personal fire hazard when used in garments. To implement the law he suggested a definite test according to which the flammability of the various materials cited could be determined. Although the suggested test leaves much to be desired it does show that the Fire Marshal is quite aware that a suitable test method is essential for the proper enforcement of the law. It will be noted, however, that many every day articles like combs, baby balls, rings, rattles, fish, ducks, dolls, which for many years have been made of gayly colored celluloid would then be outlawed in California. This led to further amendments sponsored by the California Retailers Association which eliminiated all references to nitro cellulose or celluloid and rather placed the onus of fabric flammability on the so-called "synthetic" fibers which to the lay mind at least means rayon.

After the original bill had passed the California State Legislature, Congressman Leroy Johnson of California on March 6 introduced a similar bill (H.R. 2496) in the House of Representatives which was referred to the Committee on Interstate and Foreign Commerce.

The American Association of Textile Chemists and Colorists had a committee under Dr. Redman on flame-proofing which in due time would have taken up test methods for determining the effectiveness of flame-proofing treatments. However, due to the proposed national legislation there was great urgency in having a definite means for determining flammability, so Dr. L. A. Olney appointed a special subcommittee for devising or obtaining a suitable test method for determining the flammability of consumer textiles.

This special committee met March 27 and April 16 in New York and to its meetings interested guests were invited: *e.g.* C. W. Rulon, Underwriters Laboratories; Captain R. W. Little; Dr. G. Coppick; Dr. A. L. Peiker, all working at Columbia University under the National Research Council on flame-proofing and testing fabrics for the Armed Services. Also, men from the New York Fire Marshal's office, as well as others similarly interested, were included. The committee wished to get as much help

Dr. Bonnet, American Viscose Corporation, presented this paper before a meeting of the American Association of Textile Technologists in New York, June 6. Dr. Bonnet is a member of the special subcommittee appointed by the American Association of Textile Chemists and Colorists to prepare a test for the flammability of textiles that can be relied upon to detect textiles that are dangerous to the wearer. Such textiles are defined as combustible. They burn so rapidly that the wearer cannot extinguish the fire nor remove the garment in time to escape serious injury. The test is described on page 179.

as quickly as possible from any source whatever. At the first meeting, the construction of a simple apparatus was decided upon. At the second meeting, corrections and improvements were suggested (*i.e.* standard gas, length of flame, inclination of sample so as to get a measurable time factor, automatic control as to time of application of the standard flame, rate of burning). This matter of determining the degree and rapidity of burning (flammability) is not a simple matter. The condition of the sample is another important factor. Fabrics which would not be considered flammable in a damp, humid atmosphere would flash readily when dry.

Death of Three Boys Brought Action by Congress

But the whole matter of the flammability of fabrics was suddenly and tragically brought to the attention of Congress and the nation when early in April in Washington, D. C., three small boys were burnt to death and some seven others were seriously injured when their Gene Autry cowboy suits caught fire while playing around an unattended brush fire. This brought restrictive legislation about the flammability of fabrics very much to the fore. Congressman Leroy Johnson's bill, as has been mentioned, was already before Congress, but other Congressmen were demanding immediate legislative action in the House. Under these circumstances, lest unwise legislation be forced through Congress, the Washington office of the National Retail Dry Goods Association arranged for an informal conference with Congressman Johnson and members of the special AATCC subcommittee in order to make clear that the determination of flammability of fabrics was not a simple matter, that any legislation must necessarily be implemented by an accepted standard test method applicable to any fabric, and that the test should not be based, as suggested in the original California law, on a comparison with "cotton in the natural state."

At this meeting, which occurred in Congressman Johnson's office April 20, Congressman Percy Priest of Tennessee, a member of the Interstate and Foreign Commerce Commission, was also present. Unfortunately, the chairman of our special AATCC subcommittee, Dr. Hager, could not be present due to an attack of appendicitis. However, during the testimony, given in response to questions asked by both Congressmen, it was made clear that flammability of a fabric was not necessarily due to the kind of cellulosic fibers whether cotton, linen, ramie, regenerated cellulose type of rayon, or others, from which the fabric was made, but depended upon the construction of the fabric and particularly on whether the fine fibers were brushed out or in the form of a long pile. In other words, when such cellulosic fibers are in a finely divided state for the ready access of air they are quite flammable, whereas these same fibers twisted together into a thread and then woven into a compact piece of cloth with few or no fine fibers protruding from the surface, are not flammable. Flammability may be defined as rapid combustion. When the speed is sufficiently rapid it may even become an explosion. Coal is combustible but ordinarily not flammable. If, however, it is in the form of dust, it becomes not only flammable but even explosive in its speed of combustion. Similarly when cotton, regenerated cellulose type of rayon, or other cellulosic fibers are in a finely divided state as on the surface of a napped, brushed, or pile fabric, the speed of combustion is rapid, particularly if the fibers are dry. Used in garments, such fabrics when accidentally ignited burn so rapidly that the wearer often cannot extinguish the flame nor divest himself of the burning garment before serious injury has been done. Thus the long rayon pile used on the front of the chaps of the cowboy suits burned so rapidly as to cause panic with the resultant serious or fatal injuries.

But the ready flammability of a fabric may not be due to napped, brushed, or pile fibers on the surface of a fabric. Flammability may also be caused by the use of a flammable finish, like pyroxelene, to glaze the surface and so make a cotton or rayon fabric more easily cleanable. Or again because stiffening of netting, marquisette, gauze, etc, with starch makes them soil easily and become limp when laundered unless they are restarched, some of these dainty materials, which of themselves burn quite readily because of the ready access of air, are rendered still more flammable when treated with pyroxelene as stiffening agent "which does not wash out."

Legislation about the flammability of garment fabrics is, of course, not new. In 1912 when the Eighth International Congress of Applied Chemistry met in New York, the British delegates sponsored a symposium on the flammability and flame-proofing of fabrics. It seems that cotton flannel with a fine long nap had caused the death of some English children and serious injury to others when their cotton flannel sleeping garments caught fire from the open grate coal fires so common in English homes. As a result of these accidents the Fabrics (Misdescription) Act was passed August 15, 1913. We would term this "mislabeling." This act made it "unlawful . . . . to sell or have in possession for sale any textile fabric either in the piece, or made into garments . . . . to which is attributed expressly or inferentially the quality of non-inflammability or safety from fire . . . . unless such textile fabric conforms to such standard of non-inflammability as may be prescribed by regulations to be made by the Secretary of State . . . ." The Home Secretary's regulations under this section dated January 2, 1914 were as follows:

"1. A textile fabric shall be deemed to conform to the standard of non-inflammability if when tested in accordance with the prescribed method of testing, it is not set alight, or if set alight, burns without a flame or with a flame which does not spread but converges and dies out.

"2. The prescribed method of testing requires a square yard of the fabric, four times successively washed with soap and water, dried and ironed. It is suspended ver-

Special Subcommittee of the American Association of Textile Chemists and Colorists responsible for developing a test method for determining the flammability of textiles:

Dr. H. E. Hager, General Dyestuffs Corporation, *Chairman*
Chas. W. Dorn, J. C. Penney Company
Chas. L. Simon, Industrial By-Products & Research Corporation
Cameron A. Baker, U. S. Testing Company
H. E. Wilde, Merck & Company, Inc.
Edward Young, Princeton Knitting Mills
Dr. F. Bonnet, American Viscose Corporation

tically without folds or creases and so that the lower edge shall not be selvedge or folded edge. The flame is that from a wax taper not less than 1/8 in. nor more than 3/16 in. in thickness, shall then be brought in contact with the fabric at its lower edge . . . and kept in contact for not less than 12 nor more than 15 seconds."

From this it would seem that the English Act places the onus in regard to flammability on the maker of the cloth. If no label is attached, the fabric "by inference" is supposed to withstand the test provided by the Home Secretary. The test first of all takes account of the fact that the fire retardents consist of the application of water-soluble salts to the fabric which are, of course, removed by the prescribed washing procedure. There is, however, no mention made concerning the dryness of the fabric before testing which, as has already been indicated, is an important factor. The application of the flame from a wax taper is also not clear.

California Law Found Inadequate

Other attempts at legislation to prevent accidents caused by flammable fabrics have been put forth from time to time and the California law was one of the most recent. After several amendments this bill was quite inadequate in that it specifically referred to synthetic fibers and left any fire hazard of garments and materials made from cotton and other natural fibers quite beyond the law's application. (It was the great flammability of the natural kapok fibers in the life preservers which sank the "Normandie" at her pier in New York.) In view of the fact that the federal law would doubtless be modeled after this California law, it seemed imperative that the matter of flammability of fabrics in general be explained and visually brought to the attention of the California assembly, so that fabrics made of natural as well as "synthetic" fibers should be included in their bill.

A public hearing before the California Senate Committee was scheduled for May 8 but was kindly postponed one week to permit the presentation of data and a demonstration of fabric flammability to members of the committee; also to permit various logical amendments to be made in the bill in the interest of public safety. Incidentally, the demonstration clearly showed that cotton fibers in the same fabric construction and under the same condition as to atmospheric humidity actually burned more rapidly than did viscose-type rayon. Cotton in equilibrium with the humidity of a standard atmosphere is much drier than rayon and contains approximately one half as much moisture as viscose rayon. It will quite readily be understood, therefore, why the cotton burns much more readily than the rayon if both are tested under identical conditions.

Some Synthetic Fibers Do Not Burn

The point was also brought out that certain truly synthetic fibers like nylon, "Vinyon," Seran, even in a finely divided state, do not burn, in fact do not even support combustion. The demonstration of flammability of various fabrics seemed so convincing to the legislators that the bill with amendments including fabrics made of natural as well as "synthetic" fibers was approved by the Senate committee.

In connection with the simple demonstration, the fact was stressed that the chief fire hazard to be considered was that connected with garments. All our garments will burn, especially those made of cellulosic materials, but the rate of burning of some will be much greater than others and this will depend upon conditions of fabric construction, dryness, and various factors. Those that burn rapidly are termed flammable and when used in garments are a distinct personal fire hazard since there is not time to remove a burning garment from the body. Such fabrics should not be used for garment purposes unless and until they can be made practically and permanently non-flammable. In using the term non-flammable, however, it is not intended to convey the idea of being "fire proof." A non-flammable fabric may char and may be rendered useless under head or the application of a flame but of itself it should not under ordinary conditions readily support combustion when it comes in contact with the flame of a burning match or the glow of a cigarette.

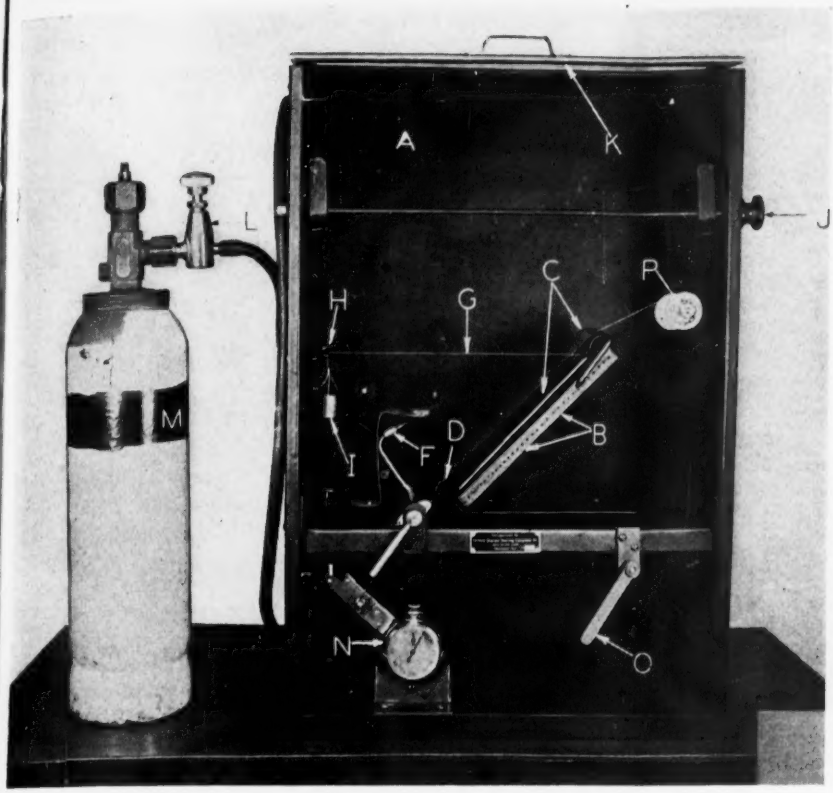
The purpose of the committee on the flammability of consumer textiles is to invent or develop some kind of test apparatus which will definitely measure the rate of burning of fabrics subjected to identical test conditions. Assuming for the moment that consistent check results can be obtained with the apparatus devised so far, it will be necessary to decide what rate of burning under the closely controlled test conditions shall be considered dangerous or a fire hazard when used for garment or various other purposes, and under garments we include not only under and outerwear, but also dressing gowns, bath robes, aprons, pinafores, and other such garments.

The committee has ordered six testers from the U. S. Testing Company, delivery of which has, unfortunately, been delayed due to the difficulty in obtaining certain parts, such as standard nozzles for the flame, pressure regulators for the control of the butane from the steel flasks, etc. These testers will be sent to various laboratories together with samples of identical fabrics and detailed instructions in regard to the operation of the machine and the preparation of the samples for test. If the tests on these fabrics show that the six cooperating laboratories have obtained practically identical results as to the burning rates of the selected fabrics, the apparatus will then be put on the market under the auspices of the American Association of Textile Chemists and Colorists and built by the U. S. Testing Company.

Mention has been made that in some cases testing methods have been incorporated in laws relating to the flammability of fabrics. Instead of including the details of some test method which might well become obsolete in time, it would seem better to designate the latest approved method of some national organization like the AATCC, the American Society for Testing Materials, the National Bureau of Standards, rather than depend upon amending the law each time. These national organizations provide tentative test methods which are ever so often under review and brought up to date as knowledge of testing and test methods increases. Hence a law based on the test methods of such national organizations would automatically be kept up to date.

Standardization means doing things in an orderly and well-coordinated manner,—one of the prime essentials in effective management.

—W. R. Hebblewhite, Secretary, Standards Association of Australia.



A. Draft-proof chamber with adjustable top.

B. Specimen rack, fixed at an angle of 45 deg, consisting of a 4 x 7 in. framework strung with heat-transmitting wire laced horizontally.

C. Specimen shield, which covers all but 1½ in. of the width of the test specimen for the full length.

D. Indicating finger, by means of which the thickness of the sample is compensated for in the throw of the gas nozzle.

F. Gas nozzle. The gas jet consists of a 36-gage hypodermic needle protected by a copper shield formed around it.

G. Stop cord, which measures the vertical height of the flame.

H. Pulley or eye, which supports and guides the stop cord.

I. Stop weight, attached by means of a clip to the stop cord.

J. Slide door control, which moves the catch mechanism used to hold the sliding door open to insert the test specimens.

K. Slide door (shown in end view) in its normal position slides in the grooves at the front of the cabinet.

L. Fuel control valve. (A flowmeter, not shown, is used to bring the fuel supply to test level by means of this control valve.)

M. cp Butane container.

N. Stop watch and timing mechanism.

O. Starting lever. (This lever is operated from left to right in one stroke and is released to operate the gas jet.)

P. Cord supply.

Automatic Machine to Measure The Flammability of Textiles

THIS automatic machine, to test the flammability of fabrics to distinguish between those that are dangerous and those that are not dangerous, has been designed as a result of the work of the Committee on Flammability of Consumer Textiles. Six of these machines are now under construction and will be sent to five companies for correlation of measurements of the rate of burning on nine selected fabrics. The machines will be used for correlation of these tests by the National Bureau of Standards, the Lowell Textile Institute, the American Viscose Company, Industrial By-Products & Research Corporation, J. C. Penney Company, and Princeton Knitting Mills.

When correlated results are obtained, a tentative test method will be prepared and submitted to the Research Council. It is expected that this method will then be accepted by various interested associations and that it will be promulgated by the National Bureau of Standards as a Commercial Standard. It may also serve as a basis for a Federal law.

Samples Are Dried

In using the machine, samples of the fabrics to be tested are dried in an oven maintained at 122 F ± 5 deg for a period of two hours and then placed in a desiccator containing dry calcium chloride with cobalt chloride for a moisture indicator.

After the test specimens show the required degree of dryness, they are entered on the 45-deg rack of the flammability tester, and the control valve from the fuel supply is opened and adjusted to the test level. A time interval of approximately five minutes must be allowed in order to drive the air from the fuel lines. A flame is then applied to the gas nozzle in its starting position. The sample rack with the test specimen in place is brought forward to the point where the indicating finger touches the face of the sample, and is then locked. The shield over the test specimen should be in place when this adjustment is made.

The cord is strung through the loop in the shield and across the top of the sample over the guide ring and then the weight is hooked in place close to and just below the guide.

The stop watch is set at zero at the start of each test. The slide door is closed at the start of the test.

Bringing the starting lever over to the extreme right and releasing it, starts the timing mechanism that applies the gas jet to the face of the fabric. The timing is automatically recorded by the watch, starting as soon as the flame is applied and ending with the cord burning through when the flames reach the cord line. This line is horizontal to the top of the sample. The tests are to be conducted in a draft-free room.

NEMA Standards for Power Switching Equipment

Power Switching Equipment Standards, Publication No. 45-94 superseding Publication No. 41-65, published in 1941, has been released by the National Electrical Manufacturers Association.

The revised standard contains practical information about the construction, test, performance, and manufacturing of power switching equipment. Copies may be obtained at $1.50 each.

ASTM Appoints Committee On Consumer Goods Standards

Implementing its decision to extend and intensify its activities in the field of standards for consumer goods, the American Society for Testing Materials has appointed an Administrative Committee to be in charge of this phase of the Society's work. Members of this committee are:

H. J. Ball, Lowell Textile Institute, *Chairman*
A. G. Ashcroft, Alexander Smith & Sons Carpet Company
A. L. Brassell, United States Testing Company
Arthur W. Carpenter, The B. F. Goodrich Company
Jules Labarthe, Mellon Institute of Industrial Research
G. C. MacDonald, Montgomery Ward and Company
H. H. Morgan, Robert W. Hunt Company

The demand for standard specifications and methods of test for consumer goods has been reflected in the work of a number of the Society's committees during the past few years, the Society declares in announcing appointment of the new committee. "There are, however," it explains, "essential differences between industrial standards and those intended for ultimate consumer goods. Industrial specifications, for example, in general are written for the use of purchasers who know how to interpret the properties set up and who usually have inspection and testing facilities, whereas specifications for ultimate consumer goods may need to have different protection clauses and be written along somewhat different lines. There may be industrial and consumer specifications covering basically the same product, but the uses, tests, and background information will differ."

The new Administrative Committee is now studying the form and content of ultimate consumer goods standards in so far as they may differ from industrial standards. Special data or special clauses that may be needed for consumer standards will be developed in cooperation with the committees working on consumer goods standards.

It is intended that the Society's standardization work on ultimate consumer goods shall deal with only such goods as will permit of definition, test data, and test limitations that can be measured by engineering methods and that the work be based upon sound engineering principles. More factual knowledge will be required concerning the wants of consumers and more basic data on use values than are now available and attention will be given to means for securing this information.

ASTM Administrative Committee on Ultimate Consumer Goods

Standing (left to right)—A. L. Brassell, Arthur W. Carpenter, R. E. Hess, A. G. Ashcroft. Seated (left to right)—H. J. Ball, Jules Labarthe, G. C. MacDonald, H. H. Morgan. These men will carry out the new program of the American Society for Testing Materials for the extension and intensification of its activities in the field of standards for consumer goods.

British Standards Provide Dictionary of Aeronautical Terms

For many years, the British Standards Institution has been working on standard nomenclature for technical terms in various fields. Particular emphasis has been given in this program to providing a dictionary of terms peculiar to the aeronautical field which would include general terms in other branches of engineering only where they have a special significance. The following glossaries have now been completed:

Acoustical Terms, B.S. 661
Aeronautical Terms, B.S. 185
Electrical Terms, B.S. 205
Highway Terms, B.S. 892
Illumination Terms, B.S. 233
Radio Direction Finding Terms, C.F. 4420
Railway Signalling, B.S. 719
Timber for Aircraft Purposes, B.S. 491
Welding and Cutting, B.S. 499

This work of the BSI has now also branched out to include servo mechanisms, and building terms, which are still in course of preparation.

Standard Filters Control Colors of Aviation Lights

Fourteen sets of filters for controlling the colors of aviation lights to prevent confusion in guiding airplane operations at night have been standardized by the National Bureau of Standards, the July issue of the NBS *Technical News Bulletin* reports. The new standard filters were prepared by the Corning Glass Works with the technical assistance of the Bureau. Ten sets of 18 glasses each have been standardized for the Army Air Forces. The remaining sets, which contain 9 filters each, will be used by the Civil Aeronautics Administration.

Vari-colored lights for many different purposes are required for controlling flight—to prevent collision in the air, to guide navigation of aircraft along airways, to identify landing areas, to guide aircraft along ap-

proachway and runway during landing and take-off operations, and to direct aircraft on the ground while taxiing. Lights for so many different purposes must be easily identified and color variation must be carefully controlled. The present colors in use by the Army, Navy, and Civil Aeronautics Administration, require the use of two types each of red, yellow, and green, and one type of blue and lunar white, as well as units without colored ware. In order to prevent lights of different colors from being confused, a careful restriction of the variation of the several colors is necessary.

General Motors Revises Index of Chemical Specifications

A new edition of the *Cross-Index of Chemically Equivalent Specifications and Identification Code*, prepared by the General Motors Corporation at the request of the Armed Services, covers a large number of government agency and engineering society specifications.

More than 100 pages are devoted to chemical analysis of the materials covered and a specification cross index is included with some 70 pages.

Copies can be obtained from the office of the Vice-president in Charge of Engineering. Requests should be directed to R. L. McWilliams, 8-135 General Motors Building, Detroit 2, Michigan.

Australian Fire Rules to Prevent Welding Accidents

The Standards Association of Australia has issued Rules for Fire Precautions in Cutting and Welding Operations, in response to requests from the Maritime Services Board of New South Wales, the Fire and Accident Underwriters' Association, the Commonwealth Department of Home Security, and other authorities, the *SAA Bulletin* reported recently. The Rules were issued in the Interim Series under the number SAA Int 201.

Carelessness in welding and cutting operations have caused fires, with resultant retarding of the war effort, the *Bulletin* reports. The burning of the "Normandie" was a glaring example of careless use of welding oxy-gas cutting tools.

ASTM Annual Meeting Recommends Approval, Revision of Standards

AT its Forty-eighth Annual Meeting June 27—a one-session business meeting instead of the full five-day meetings customarily held—, the American Society for Testing Materials authorized the adoption as formal standard of some 35 tentative standards previously published, as well as revisions in some 40 existing standards. Action on the formal standards, as distinct from tentative standards, can be taken only at an Annual Meeting of the Society. The meeting also considered changes in the By-laws which are to be submitted to the members as a step toward preparing the Society for an intensive peacetime expansion of its work on standardization of specifications and tests and extensive research on properties of engineering materials.

In connection with the Annual Meeting, the Committee on Standards held a special meeting to consider approval of new tentative standards and revisions of existing tentative standards. This committee functions throughout the year, reviewing recommendations from the Society's standing committees to determine that a consensus has been reached. Some 55 new tentatives were accepted, and many existing tentative standards were revised.

The standards approved originated from the work of committees in the field of metals, construction materials, and the general nonmetallic materials. Committee B-5 on Copper and Copper Alloys, Cast and Wrought, had two of its important tests approved for letter ballot of the Society—one the expansion test for copper tubing, the other the mercurous nitrate test—in addition to specifications for brass wire, alloy condenser tube plates, forging rods, bars and shapes, and the classification of cast alloys.

In the field of light metals, tentatives covering anodically coated aluminum, test for sealing, for weight of coating, and dielectric strength, will eventually be adopted, the ASTM announces.

Five methods for analyses of various pigments, specification for oiticia oil, and the methods for evaluating the degree of resistance to blistering, reported by the Committee on Paint, Varnish, and Related Materials, were considered. The Committee on Paper and Paper Products submitted for adoption five tests covering grease resistance, degree of staining, kerosine number, surface wettability, and tests for wire and felt sides of paper. Standards in the field of soaps and other detergents, chemical analysis of metals, refractories, and thermal insulating materials are also to be sent to ballot.

New officers of the Society, whose terms became effective at the close of the Annual Meeting, include:

J. R. Townsend, Materials Engineer, Bell Telephone Laboratories, Inc, New York, N. Y., *President;*

T. A. Boyd, Head, Fuel Department, Research Laboratories Division, General Motors Corporation, Detroit, Mich., *Vice-president.*

New Tentative Standards

The approval of new tentative specifications and tests is an indication of new work resulting from the technical committees' deliberations. Five specifications covering various types of beryllium copper in the form of strip, rod, and wire were among the new tentatives approved at the meeting. Other new tentatives cover tests for resistance of traffic paints to abrasion; for producing films of uniform thickness on panels; analyzing petroleum sulfonates; and several new tests covering paper and paper products—such items as ply adhesion, wet curl, and edge-tearing strength. Still other items include tests for gas content of insulating oils; methods for identifying synthetic elastomers; and a standard practice for conditioning rubber and plastic materials for low-temperature testing.

Nineteen new tentative standards are in the field of industrial aromatic hydrocarbons — benzene, toluene, xylene, etc. These include both specifications and tests for products in this rapidly growing field.

Proposed Standard Plumbing Code Will Aid Postwar Building Program

TO fill a long recognized need, to foster uniformity and simplification of plumbing codes, and as an aid to the vast postwar housing construction program, a proposed American Standard Plumbing Code has been completed under the procedure of the American Standards Association by a nationally representative committee organized under the sponsorship of the American Public Health Association and the American Society of Mechanical Engineers.

At a meeting of this committee, (the Sectional Committee on Minimum Requirements for Plumbing and Standardization of Plumbing Equipment) September 6, the proposed code will be put into final form for submittal to the American Standards Association. When approved by the ASA, it will be made available in booklet form as the American Standard Plumbing Code, A40.

The many cities now engaged in revising their existing plumbing codes, or writing new codes in anticipation of an unprecedented volume of housing, building and industrial construction, are looking forward to making use of the new standard plumbing code.

A prime objective of the code is to provide for America the highest standards of individual and public health and sanitation in the world, by the prevention of water and air pollution and contamination. The newest developments in such important aids to public health as the recently completed American Standards for Air Gaps, Cross Connections, Back Flow Preventers, and Vacuum Breakers constitute some of the most up-to-the-minute features of that code.

Extensive Research

Extensive research carried on in nationally recognized plumbing and hydraulic laboratories has provided the technical background upon which the tables, diagrams, and other design factors included in that code are based.

Before undertaking the writing of that model code, a committee consisting of well qualified authorities representing 29 national organizations reviewed and briefed many well known and nationally recognized federal, state, and municipal plumbing codes. The resulting code is simple in language and lends itself readily to adoption by states and municipalities.

The committee began its work in 1939 with the appointment of a fully representative subcommittee whose first duty was to study in detail the many well known and recognized federal, state, and municipal plumbing codes. When an outline of the proposed national code had been made, it began to draft the several sections through the activities of subgroups. In all, three drafts were made, two of which were distributed broadly to the industry and to state and city officials for their constructive criticism and comment. Hundreds of comments were received, briefed, and studied. The present May 1945 and final draft represents a conscientious effort to harmonize all the data, information, and opinions received as a result of that distribution.

The proposed American Standard Plumbing Code consists of the following sections: Introduction, (1) Definitions, (2) General Regulations, (3) Materials, (4) Joints, (5) Traps, (6) Hangars, (7) Plumbing Fixtures, (8) Water Supply, (9) Soil and Waste Pipe, (10) Storm Drains, (11) Vents, (12) Indirect Wastes, (13) Inspection, (14) Administration. In addition, it will include an Appendix with illustrative drawings and explanations.

Never before has such a thorough and complete study of this subject, so important to life and health, been made in this country. The personnel of the committee which developed and approved it consists of 6 engineers and licensed plumbers, 8 manufacturers of plumbing equipment, 7 federal, state, and city officials concerned with the enforcement of plumbing codes, and 7 representing the general public. It therefore represents the best statement of balanced judgment on regulations in this field available at this time.

Eventually the new code is expected to take the place of the many hundreds of different and conflicting plumbing codes now in existence. The resulting standardization and simplification, it is believed, will result in better designed plumbing systems and in lower consumer costs.

Standards in Institutional Purchasing to Be Discussed in University Courses

How to apply standards of quality in purchasing institutional supplies and medical and surgical supplies will be the subject of evening courses to be given at Columbia University from October 1, 1945 through May 21, 1946, by Dewey H. Palmer, Research Director of the Hospital Bureau of Standards and Supplies, Inc.

Emphasis will be placed in these courses on the requirements included in standards and specifications for these materials and the place of quality control in purchasing procedures.

In the winter course, on Standards of quality for institutional supplies, the major types of maintenance supplies and equipment for laundry, kitchen, heating plant, and building will be considered. Standards and service characteristics of soaps and cleaning compounds, institutional textiles, waxes and paints, insecticides, and wall and floor covering materials will be studied in detail. Consideration will also be given to the standards which have been established for processed foods.

In the spring course, on standards of quality for medical and surgical supplies, such types of materials as surgical dressings, adhesive tape, suture materials, rubber gloves, and other rubber products, instruments, and drugs and pharmaceuticals will be given detailed consideration.

The courses are designed for persons who are preparing for or are employed in administrative positions in hospitals, hotels, and other institutions with volume purchasing.

Bell Laboratories Consolidate Standards Departments

The Materials Standards Department of the Bell Telephone Laboratories has been consolidated with the Chemical Laboratories of that company thus bringing together those concerned with chemical and metallurgical research and materials engineering, a recent issue of the *Bell Laboratories Record* announces.

What Is the Present Status of Metric Screw Thread Standards?

Repeated inquiries from American industry about foreign standards for metric threads, and the keen interest of such groups as the aircraft industry in the place of metric threads in postwar production led to the preparation of this review based on data on file with the American Standards Association.

By John Gaillard

Mechanical Engineer, American Standards Association

INQUIRIES about the status of metric screw threads in foreign countries have been received frequently by the American Standards Association during the last few years. These inquiries have been made for several reasons.

After the present war had started in Europe, for example, many American companies undertook the manufacture of equipment which up to that time had been made in metric countries. Although blueprints of the original drawings were available, the specifications, including those for metric threads, often called for clarification. Sometimes the original threads had to be reproduced within rather close limits to secure interchangeability or the proper fitting together of components. In other cases the American manufacturer wanted to find out what American thread he could use to approximate, in regard to pitch and depth of thread, a metric thread specified on a foreign drawing.

Interest Growing for Postwar Planning

Now, too, companies are becoming interested in foreign thread systems with a view to postwar planning. After the war the international unification of screw thread systems will become an important technical problem. Active discussions of the unification of inch threads (American Standard and British Whitworth) have already been started. However, participation in the international work by such countries as France and the USSR is bound to bring up the question of metric threads. With a view to the future expansion of air transportation, the aircraft industry in the United States, for one, has a keen interest in this matter right now.

It is often assumed that the establishment of an "International System" of metric threads, almost 50 years ago, has led to complete uniformity of these threads in all European countries. The truth is, however, that, while international unification has gone a long way, there are still a number of differences between some of the national standards.

Before the present war, national standards for metric threads were established in 14 countries: Austria, Czechoslovakia, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Poland, Sweden, Switzerland, and USSR. Also, a British War Emergency Standard for metric threads was approved in 1943. These various standards will be reviewed here so that any manufacturer who has to produce metric threads may know at once what standard will give him the necessary information.[1]

[1] Copies of the national standards of other countries listed in this article are available from the American Standards Association.

Metric-thread systems had been used in European Continental countries since 1848, particularly in France, Germany, and Switzerland. Efforts toward international unification of these systems led in 1898 to a conference in Zurich, Switzerland, which was attended by representatives from engineering societies and other technical organizations in France, Germany, Italy, the Netherlands, and Switzerland. Organizations in other countries, such as the United States and Great Britain, were also invited but did not send delegates.

First Step Toward International Unification

The Zurich Conference of 1898 adopted a system of metric threads which was practically the same as that previously developed in France by the Society for the Encouragement of the National Industry. This system became known as the "International System" and is usually designated as the "SI System" (from the French name, "Système International"). This system was recommended for adoption by all countries where metric threads were used and

Table 1.—International (or "SI") System of Metric Threads
(With modified pitches for diameters 72, 76, and 80 mm)

Nom Diam	*Pitch (mm)*	*Nom Diam*	*Pitch (mm)*	*Nom Diam*	*Pitch (mm)*
6	1	20	2.5	48	5
7	1	22	2.5	52	5
8	1.25	24	3	56	5.5
9	1.25	27	3	60	5.5
10	1.5	30	3.5	64	6
11	1.5	33	3.5	68	6
12	1.75	36	44	72	6
14	2	39	4.5	76	6
16	2	42	4.5	80	6
18	2.5	45			

NOTE: This article is adapted from an article by Dr. Gaillard published in *American Machinist*, June 7, 1945.

covered a range of nominal diameters from 6 to 80 mm, inclusive, with associated (coarse) pitches. The threads were intended for use as fastening threads in machine construction and hence, in the first place, for application to the general types of bolts, screws, and nuts. Shortly after the Zurich Conference, the pitch of 6.5 mm for the diameters 72 and 76 mm, and the pitch of 7 mm for the diameter 80 mm, were changed to 6 mm, by agreement between France, Germany, and Switzerland. The SI System thus modified, covers the threads given in Table 1. These have been adopted as standard in all of the countries listed above and are completely interchangeable, independent of their origin.

The thread angle of the SI System is 60 degrees. The thread is truncated at crest and root to a depth equal to $\frac{1}{8}$ of the height (H) of the basic triangle, or depth of the V-thread (Fig. 1). Accordingly, the width of the truncated crest of the basic profile is $\frac{1}{8}$ pitch. A maximum crest clearance $H/16$ was specified, to be taken from the root opposite the crest. The form of the root was optional, but a rounded form was recommended. In this respect, the various national standards show slight differences, but this does not affect the interchangeability of the threads. The basic profile of the SI thread, in combination with a rounded crest clearance equal to 0.05 pitch, as adopted in several national standards, is shown in Fig. 1. As to diameter-pitch ratio, the original SI threads were comparable to the American Standard Coarse and the British Standard Whitworth threads.

The need of metric coarse threads in sizes smaller than 6 mm and larger than 80 mm, and of metric fine threads, led a number of Continental European countries to extend the original SI series. However, these additional series showed differences in respect to nominal diameters, pitches, and diameter-pitch combinations. National standardizing bodies, organized in Europe during and after the first World War, made an effort to bring some order in these additional series. In 1926, the International Standards Association (ISA) was founded and one of its first technical committees dealt with metric threads.

At a conference held in Copenhagen in 1931, this committee succeeded in getting agreement in principle on five recommended series of metric threads, designated by the letters A to E. It took several more years to put the final touches on this unification plan and ISA Bulletin 26, in which the recommended ISA Series are listed, was not published until September, 1940 (Table 2). The original series of SI coarse threads was extended to diameters as large as 600 mm (about 24 in.), the pitch being 6 mm for all sizes above 80 mm. Therefore, the term "coarse" threads was avoided and the original SI series, with its upward and downward extensions, was designated as "ISA Series A." However, ISA Bulletin 26 and the national standards set up in accordance with it, explicitly refer to the ISA Series B to E, inclusive, as Fine Threads.

Table 2—International Metric Screw Thread Series

(According to ISA Bulletin 26, September, 1940)

Nom Diam mm	Pitch mm			Nom Diam mm	Pitch mm					Nom Diam mm	Pitch mm				
	A	*B*	*C*		*A*	*B*	*C*	*D*	*E*		*A*	*B*	*C*	*D*	*E*
1	0.25	0.2		18	2.5	1.5	1			60	5.5	4	3	2	1.5
1.2	0.25	0.2		20	2.5	1.5	1			62		4	3	2	1.5
1.4	0.3	0.2		22	2.5	1.5	1			64	6	4	3	2	1.5
1.7	0.35	0.2		24	3	2	1.5	1		65		4	3	2	1.5
2	0.4	0.25		25		2	1.5	1		68	6	4	3	2	1.5
2.3	0.4	0.25		26		2	1.5	1		70		4	3	2	1.5
2.6	0.45	0.35		27	3	2	1.5	1		72	6	4	3	2	1.5
3	0.5	0.35		28		2	1.5	1		75		4	3	2	1.5
3.5	0.6	0.35		30	3.5	2	1.5	1		76	6	4	3	2	1.5
4	0.7	0.5		32		2	1.5	1		78		4	3	2	1.5
4.5	0.75	0.5		33	3.5	2	1.5	1		80	6	4	3	2	1.5
5	0.8	0.5		35		3	2	1.5	1	82		4	3	2	1.5
5.5	0.9	0.5		36	4	3	2	1.5	1	85(84)	6	4	3	2	1.5
6	1	0.75		38		3	2	1.5	1	88		4	3	2	1.5
7	1	0.75		39	4	3	2	1.5	1	90(89)	6	4	3	2	1.5
8	1.25	1	0.75	40		3	2	1.5	1	92		4	3	2	1.5
9	1.25	1	0.75	42	4.5	3	2	1.5	1	95(94)	6	4	3	2	1.5
10	1.5	1	0.75	45	4.5	3	2	1.5	1	98		4	3	2	1.5
11	1.5	1	0.75	48	5	3	2	1.5	1	100(99)	6	4	3	2	1.5
12	1.75	1.5	1	50		3	2	1.5	1	102		4	3	2	1.5
14	2	1.5	1	52	5	3	2	1.5	1	105(104)	6	4	3	2	1.5
15		1.5	1	55		4	3	2	1.5	108		4	3	2	1.5
16	2	1.5	1	56	5.5	4	3	2	1.5	110(109)	6	4	3	2	1.5
17		1.5	1	58		4	3	2	1.5	etc.		4	3	2	1.5

Diameters below 6 mm. In the diameter range from 1 to 5.5 mm, inclusive, the French national standard differs from ISA Series A, see Table 3.

Diameters above 80 mm. For Series A, ISA Bulletin 26 gives the diameter progression 5-0-5, from 85 to 150 mm, inclusive, as well as the progression 4-9-4, from 84 to 149 mm, inclusive (see values in parentheses). The progression 5-0-5 has been adopted in Denmark, Finland, France, Italy, Netherlands, Sweden, Switzerland, and USSR. The progression 4-9-4 has been adopted in Czechoslovakia, Germany, Norway, and Poland. For Series B to E, inclusive (Fine Threads), ISA Bulletin 26 gives the diameter progression 2-5-8-0, from 110 to 300 mm, inclusive.

Present International Agreement

Although ISA Bulletin 26 was published after the second World War had already begun in Europe, and the ISA became inactive for the duration in 1942, the international agreement reported in the Bulletin may be considered as an effective one, since the basic unification had been established as far back as 1931 (see above). This is the reason why the various national standards—particularly those approved after the Copenhagen Conference of 1931—follow the ISA Series so closely. For example, the metric threads given in the Swiss national standard sheets published in 1931 (see page 187), are in complete harmony with ISA Bulletin 26. Incidentally, the Swiss sheets also carry notes indicating the extent to which the national standards for metric threads adopted at that time in other countries conform or do not conform to the ISA Series.

Differences in National Practice

To list the deviations from the ISA Series that occur in national standards would be more confusing than helpful. Those who have problems in this field will get a quicker answer by consulting the national standard involved. However, two of the more important differences in national practice should be mentioned. One is the deviation of the French national standard from the ISA Series in sizes below 6 mm (see Table 3).

The other difference in national practice concerns the progression of the nominal diameters above 80 mm, in ISA Series A. Most countries (Denmark, Finland, France, Italy, Netherlands, Sweden, Switzerland, and USSR), use the progression 85, 90, 95, and so on, briefly designated as the 5-0-5 progression. Some other countries (Czechoslovakia, Germany, Norway, and Poland) have adopted the progression 84, 89, 94, and so on, called the 4-9-4 progression. This is based on the following idea. An external machine part may have to be mounted with a small clearance on the smooth portion of an internal part, such as a shaft, and kept in place by means of a nut or other threaded component which is screwed on to a threaded extension of the shaft. In Germany, all diameters up to 200 mm that end in zero or 5 belong to the national standard series of diameters. From 200 to 500 mm, inclusive, German standard diameters increase by 10 mm. If the major diameter of the metric thread on the shaft extension is kept one millimeter (about 0.04 in.) smaller than the diameter of the smooth portion of the shaft, the thread can be covered with a piece of sheet metal having a thickness of 0.5 mm (about 0.2 in.) to protect it against damage while the external part is being mounted on the shaft. In the ISA Fine Thread Series B to E, the diameter progression from 110 upward is 102, 105, 108, and so on, which is called the 0-2-5-8 progression.

Table 3.—French National Standard Metric Threads (SI Form)

(Nominal Diameters 1 to 5.5 mm, inclusive)

Nominal Diam (mm)	*Pitch (mm)*	*Nominal Diam (mm)*	*Pitch (mm)*
1	0.25	2.5	0.45
1.2	0.25	3	0.6
1.4	0.3	(3.5)	0.6
1.6	0.3	4	0.75
1.8	0.4	(4.5)	0.75
2	0.4	5	0.9
2.2	0.45	(5.5)	0.9

NOTE: Use of the sizes in parentheses should be avoided, if possible.

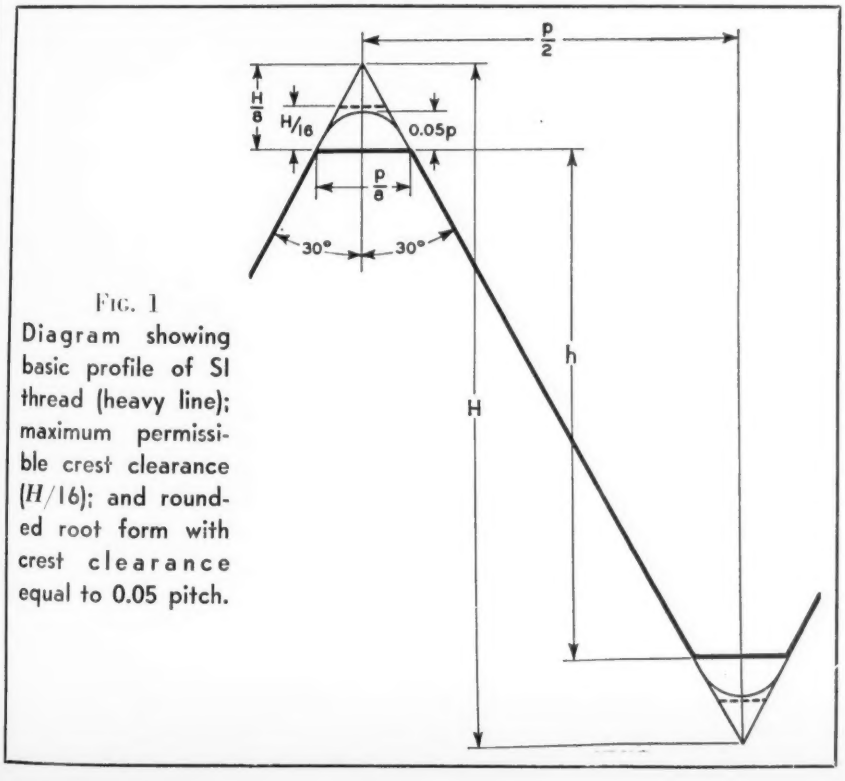


FIG. 1 Diagram showing basic profile of SI thread (heavy line); maximum permissible crest clearance (*H*/16); and rounded root form with crest clearance equal to 0.05 pitch.

British War Emergency Standard

The British Standards Institution has published a war standard for Metric Screw Threads (BS 1095-1943) for the information of manufacturers and others who have to use such threads. The standard states, however, that metric threads should be used only "when called for on established designs and where interchangeability with existing parts is imperative." The British Standard covers the metric threads of ISA Series A in sizes from 6 to 80 mm; the upward extension with the 5-0-5 progression (85, 90, 95, etc); and the downward extension from 1 to 5.5 mm. It also gives the French Standard series of sizes from 1 to 5.5 mm (see Table 3). Tables of thread limits and tolerances for three classes of fits, developed by the British, have been added (see page 186).

Crest Clearance

In this respect also, there are differences between the national standards. The French standard merely specifies the maximum value (*H*/16) permitted in the SI System and recommends the use of a rounded root. A nominal crest clearance, 0.05 pitch, has been adopted in the following countries: Austria, Czechoslovakia, Finland, Italy, Netherlands, Norway, Poland, and Switzerland. The value, 0.045 pitch, has been adopted in Denmark, Germany, Japan, and USSR. It appears to have originated long ago in Germany, when a crest clearance equal to 1/19 pitch (or about 0.04558 pitch) was adopted. In Sweden, no specific value for the crest clearance is recommended.

Fits for Metric Threads

The SI System did not include any specifications for the limiting dimensions of screw and nut. Therefore, the choice of the fit in terms of pitch diameter tolerances and, if desired, an allowance (as applied in the American Standard Class 1 fit), was left to the designer. When the present war broke out, the ISA had not yet made any recommendations in this respect, and up to the present time the only countries where national specifications for metric thread limits have been adopted are Germany, Great Britain, and USSR. The French national standard says merely that the nut is basic; that a pitch diameter allowance (if any) shall

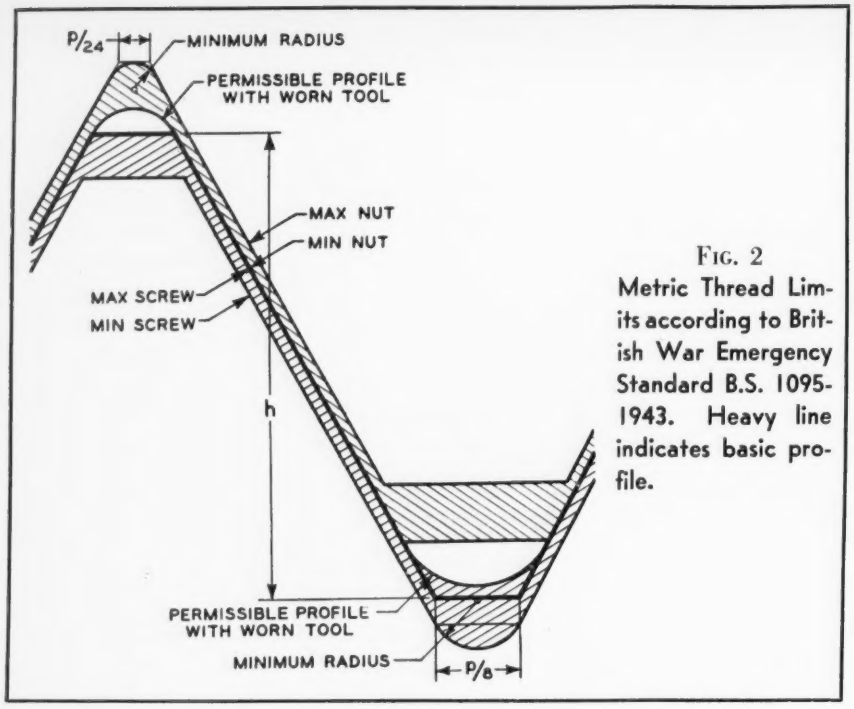


FIG. 2
Metric Thread Limits according to British War Emergency Standard B.S. 1095-1943. Heavy line indicates basic profile.

be taken in the screw; and that the designer should decide on the proper values of the tolerances and allowance, in connection with the purpose of the thread.

German Thread Fits

A German standard sheet (Appendix 3 to DIN 13 and 14) specifies the limits of the screw and nut, for metric threads belonging to ISA Series A (see Table 2), in nominal sizes from 2 to 149 mm, inclusive. Two grades of accuracy are given, which are designated as Medium and Coarse. The Medium grade tolerances are given for the entire range of sizes (2 to 149 mm) and the Coarse grade tolerances, for the range 5 to 149 mm, inclusive. The pitch diameter tolerances on screw and nut are equal and there is no pitch diameter allowance. Therefore, the maximum screw and the minimum nut have metal-to-metal contact.

The set-up of the German system of thread limits is explained in a separate German standard (DIN 2244). At the time this was published (1933), a third grade of tolerance (Fine) was being considered. This was to be based on pitch diameter tolerances on screw and nut equal to 2/3 of the Medium grade tolerances for the corresponding sizes. However, no German standard for Fine grade tolerances was listed in the latest catalog of German standards (Autumn 1940) received by the ASA.

Metric Thread Fits in USSR

Tolerances and limits for metric threads used in Russia in nominal sizes from 6 to 68 mm (see OST 32) are given in OST 1251 and 1252, for two grades of accuracy corresponding to the German Medium and Coarse grades. No pitch diameter allowance is specified. Similar data for metric threads in sizes from 72 to 600 mm, with constant pitch of 6 mm (see OST 193) are found in OST 1253. Finally, corresponding data for threads in sizes from 1 to 5 mm (see OST 94) are given in OST 1254, for the two grades of accuracy.

British Metric Thread Fits

The British Standard 1095-1943 gives tables for the limiting dimensions of threads in ISA Series A, in sizes from 6 to 60 mm, inclusive. It gives corresponding data for threads of special diameters, pitches, and lengths of engagement, in sizes ranging from above 3 mm to 500 mm, inclusive, and for pitches from 0.5 to 6 mm, inclusive. The British have adopted three grades of thread tolerances, designated as Close, Medium, and Free. In each grade, the pitch diameter tolerances on the screw and nut are equal. They are applied from the basic pitch diameter, plus for the nut and minus for the screw. In other words, there is no pitch diameter allowance.[2]

In Fig. 2, the basic profile of the SI thread is shown by a heavy line and the British tolerance zones for the screw and nut are indicated for a Free fit. This shows great similarity with that of a Class 2 or 3 fit

[2] In a recent addendum to the British Standard, provision is made for a fit with a P.D. allowance (to be taken in the screw) and "Free fit" tolerances. This fit is to be used only in special cases, such as for certain armament work.

Table 4.—Comparison of Pitch Diameter Tolerances Applicable to Metric Threads and American Standard Threads

Metric Thread (ISA Series A)	*Grade of Tolerance*	*Pitch Diameter Tolerance on Screw and Nut (inch)**	
		D = 24 mm, p = 3 mm	D = 10 mm, p = 1.5 mm
German Standard (DIN 13 and 14, App 3)	Medium	0.0070	0.0049
	Coarse	0.0116	0.0082
British Emergency Standard (BS 1095-1943)	Close	0.0046	0.0032
	Medium	0.0068	0.0048
	Free	0.0102	0.0071
American Standard Coarse Thread (B1.1-1935)	*Grade of Tolerance*	*1"—8 NC*	*⅜"—16 NC*
	Class 3	0.0054	0.0032
	Class 2	0.0076	0.0045
	Class 1**	0.0111	0.0063

* The inch values have been converted, with close approximation, from the metric values.

** American Standard Class 1 threads have a pitch diameter allowance, but the German Coarse and British Free grade threads have none.

between American Standard threads.

Comparison of Thread Fits

Table 4 lists the pitch diameter tolerances of the various British and German grades of accuracy adopted for metric threads in ISA Series A, for nominal sizes of 10 mm (about 0.394 in.) and 24 mm (about 0.945 in.). For easier comparison, Table 4 also gives the pitch diameter tolerances for American Standard Coarse threads in sizes 3/8 and 1 inch, for Classes 1, 2, and 3.

National Metric Thread Standards

For the convenience of those wishing to refer to the respective national standards, these are listed below. In some cases, a series of threads is given on two or more sheets, each of which covers a part of the total size range.

Therefore, it is recommended that anyone asking for a copy of a national standard state the sizes of the threads in which he is interested.

FOREIGN STANDARDS FOR METRIC THREADS

(Listed according to thread sizes covered)

WITH few exceptions foreign standards for metric threads are published on single sheets, instead of in pamphlet form. Therefore, if a manufacturer is concerned with a limited range of metric threads, he will need only the sheet or sheets covering that range. For convenience, the metric-thread standards of 14 countries are listed below in respect to size ranges and corresponding standard numbers. In some cases, a given series of threads is published on two or more sheets, each of which covers a part of the total range. So to avoid errors when ordering foreign standards on metric threads from the American Standards Association, it is suggested that the size or sizes of threads wanted be specified.

It should be noted that the designations of series, as given on these national standards sheets, do not in general agree with the ISA series designations A to E. Thus, a sheet known as Series II is not equivalent to ISA series B, thus showing how detail variations cause confusion.

AUSTRIA

1 to 10 mm. (M. 1501); 6 to 80 mm. (M 1502).

CZECHOSLOVAKIA

Series *A*, 1 to 149 mm., Fine Threads: Series *B*, 1 to 300 mm.; Series *C*, 8 to 300 mm.; Series *D*, 24 to 300 mm.; Series *E*, 35 to 300 mm. (All in pamphlet CSN 1001-1936).

DENMARK

1 to 10 mm. (DS 5); 6 to 80 mm. (DS 6). Fine Threads: Series I, 1 to 300 mm. (DS 128, 4 sheets); Series II 8 to 300 mm. (DS 129, 4 sheets); Series III, 24 to 200 mm. (DS 130, 2 sheets); Series IV, 35 to 150 mm. (DS 131, 2 sheets).

FINLAND

1 to 10 mm. (BI.2); 6 to 80 mm. (BI.3); 64 to 149 mm. (BI.4). Fine Threads: 1 to 80 mm. for bolts, screws, and nuts (BI.11); 14 to 52 mm. pitch 1.5 mm. (BI.12); 34 to 100 mm. pitch 2 mm. (BI.13); 55 to 200 mm. pitch 3 mm. (BI.14); 82 to 500 mm. pitch 4 mm. (BI.15).

FRANCE

1 to 2.5 mm. (CNM 132); 3 to 125 mm. and upward by 5 mm. (CNM 3). Fine Threads: 6 to 85 mm. and upward by 5 mm.; pitches from 0.75 to 6 mm. (CNM 31).

GERMANY

1 to 10 mm. (DIN 13); 6 to 149 mm. (DIN 14). Fine Threads: Series 1, 154 to 499 mm. pitch 6 mm. (DIN 241); Series 2, 24 to 189 mm. (DIN 242); Series 3, 1 to 300 mm. (DIN 243, 3 sheets); Series 4, 12 to 250 mm., pitch 1.5 mm. (DIN 516); Series 5, 9 to 82 mm., pitch 1 mm. (DIN 517); Series 6, 6 to 80 mm. pitch 0.75 mm. (DIN 518); Series 7, 4.5 to 80 mm. pitch 0.5 mm. (DIN 519); Series 8, 3 to 50 mm. pitch 0.35 mm. (DIN 520); Series 9, 2.3 to 22 mm. pitch 0.25 mm. (DIN 521).

GREAT BRITAIN

6 to 125 mm. and upward in steps of 5 mm. and special threads in sizes from above 3 to 500 mm. and pitches from 0.5 to 6 mm. (BS 1095-1943).

ITALY

1 to 80 mm. (UNI 159). Fine Threads: Series B, 1 to 80 mm. (UNI 160); 1 to 600 mm. pitch 0.25 to 6 mm. (UNI 16).

NETHERLANDS

1 to 9 mm. (N 81); 10 to 149 mm. (N 82). Fine Threads: 1 to 100 mm. (N 179); 100 to 300 mm. (N 1144).

NORWAY

1 to 30 mm. (NS 72); 33 to 149 mm. (NS 73). Fine Threads: Series B, 1 to 189 mm. (NS 268); Series C, 24 to 200 mm. (NS 2569); Series D, 36 to 200 mm. (NS 270).

POLAND

1 to 33 mm. (PN-G 205); 33 to 149 mm. (PN-G 206). Fine Threads: Series A, 1 to 33 mm. (PN-G 216); 33 to 149 mm. (PN-G 217); Series B, 24 to 149 mm. (PN-G 227). Note: The Polish designations *A* and *B* do not refer to the ISA Series with the corresponding designations.

SWEDEN

1 to 150 mm. (SMS-2B). Fine threads for bolts, screws, and nuts, 1 to 80 mm. (SMS-181A). Threads for general engineering purposes: 4 to 50 mm. pitch 0.5 mm. (SMS-401); 6 to 75 mm. pitch 0.75 mm. (SMS-402); 8 to 100 mm. pitch 1 mm. (SMS-403); 12 to 150 mm. pitch 1.5 mm. (SMS-182A); 24 to 200 mm. pitch 2 mm. (SMS-183A); 36 to 300 mm. pitch 3 mm. (SMS-184A); 56 to 400 mm. pitch 4 mm. (SMS-185A); 155 to 600 mm. pitch 6 mm. (SMS-404).

SWITZERLAND

Review of series *A* to *E*, diameters and pitches, VSM 12001. The series on sheet VSM 12001 are identical with those in ISA Bulletin 26. (In ISA Series *A*, the Swiss follow the 5-0-5 progression, for diameters above 80 mm.) 1 to 10 mm. (VSM 12002); 6 to 80 mm. (VSM 12003); 85 to 150 mm. (VSM 12004). Fine Threads: Series *B*, 1 to 150 mm. (VSM 12005, 3 sheets); Series *C*, 8 to 150 mm. (VSM 12006; 2 sheets); Series *D*, 24 to 150 mm. (VSM 12007, 2 sheets); Series *E*, no standard published.

U.S.S.R.

6 to 68 mm. (OST 32); 72 to 600 mm. pitch 6 mm. (OST 193); 1 to 5 mm. (OST 94). Series 1, 1 to 400 mm. (OST 271); Series 2, 6 to 300 mm. (OST 272); Series 3, 8 to 200 mm. (OST 4120); Series 4, 9 to 150 mm. (OST 4121); Series 5, 42 to 125 mm. (OST 4122).

What the Standards Association Of Australia Is Doing

Aircraft Steels.—The Australian Department of Air is considering recommendations for the rationalization of aircraft steel specifications. These recommendations were submitted by the Aircraft Steels Advisory Subcommittee of the Standards Association of Australia.

Bicycle Components and Accessories.—A committee has been organized to prepare Australian standards for bicycle components and accessories. The Secondary Industries Commission of the Department of Post-War Reconstruction has urged the promulgation of such standards in view of the importance of the bicycle industry in Australia.

Department of Post-War Reconstruction Asks SAA for Standards

Building Standards.—At the request of the Department of Post-War Reconstruction, the SAA is drafting standards for builders' hardware, covering such items as door locks and latches, door furniture, hinges, sash lifts, pulleys and balances, window sash supports, cupboard latches, and locks and bolts. A specifications drafting committee is considering dimensions, materials, finish, quality, and performance of these items.

Among other building standards on which work is going forward is a revision of the Australian Standards for Wash Tubs, A17-1934. The Experimental Building Station of the Council for Scientific and Industrial Research is studying the optimum height of tubs for inclusion in the proposed revision.

Draft specifications for baths, basins, and sinks are under way. The problem of standard tap-hole centers has been referred to the State Housing Authorities. Investigations concerning the over-all size, bowl-size, position of plug, and installation height of combination sinks and drainers are being made by the Experimental Building Station.

Electro-Plated and Chemical Finishes of Metals.—A committee has been organized to prepare specifications for chromium plating and blueing of steel. Preliminary work on a specification for oxide coating of ferrous materials in aqueous solutions has already been completed, and work is under way on chromium plating.

Gaging Practice.—Committees of the SAA, working under the supervision of a coordinating committee of experts in the Department of Munitions, Department of Aircraft Production; and National Standards Laboratory, are drafting sections of a Manual of Gaging Practice. The work was requested by the Deputy Director-General of Munitions. Individual sections of the Manual will probably be published separately for use in binders.

Milk Cans.—A questionnaire has been circulated by the Association at the request of the Department of Agriculture to determine what changes should be made in the quality and design of milk cans. Criticisms received have pointed to faulty tinning, lack of uniformity in design, unsatisfactory design to withstand rough handling, lack of interchangeability of covers, faulty fitting of top rim and handles to the body of the can, and general mechanical faults.

American War Standards Used in SAA Radio Work

Radio Material, Components, and Apparatus.—A wide range of specifications is being prepared by the newly formed Radio Materials, Components, and Apparatus Sectional Committee. The committee is working cooperatively with the Services and the Institution of Radio Engineers in reviewing drafts prepared by other agencies and preparing drafts of its own. The program includes ceramic insulating material, hook-up wire, capacitors, resistors, transformers, rectifiers, electron tube sockets, and general methods of testing.

In this work, American radio specifications prepared by the American Standards Association and by the U. S. Army-Navy Electronic Standards Agency are proving an extremely useful basis for drafting purposes, the *SAA Bulletin* declares. A series of radio component specifications prepared by an Inter-Service Committee in Great Britain, and issued through the British Standards Institution, is also proving helpful, the *Bulletin* announces.

French Standards Just Received by ASA

The end of the war has revived interest in international cooperation on standards, and information about standardization activities is again being exchanged between the United States and some of the European countries formerly cut off by the war.

Recently, the American Standards Association received a large shipment of standards from the French national standardizing association, the Association Francaise de Normalisation. The standards are available in the Library of the American Standards Association and may be borrowed by ASA Members. Although the titles listed below are in English, the standards themselves have not been translated. A partial list of the French standards received by the American Standards Association is given below.

Title	*NF Number*
Chemical Analysis of Steels and Cast Irons; Vanadium Content, Oct 1944	A30-114
Classification of Electrical Machinery for resistance welding, heating and upsetting, March 1944	A82-010
Classification of Material for Electric Arc and Atomic Hydrogen Welding, March 1944	A85-010
Classification of Material for Gas Welding and Related Processes, March 1944	A84-010
Classification of Oxy-Cutting Machines, March 1944	A83-010
Colonial Woods—Market Sizes, Dec 1944	B53-014
Conventional Chemical Designation of the Metals and Alloys, May 1944	A02-001
Glass Fiber — Terminology: Methods of Discrimination between Textile and Non-Textile Glass Fibers, May 1944	B38-001
Hot Rolled Carbon Steel Bars for Common Use, Jan 1943	A45-010
Nonferrous Metals—Zinc Alloys, May 1944	A55-010 Cir
Siderurgical Products of Hot Rolled Steel — Special Shapes for Agricultural Machinery—Wheels:	
Cambered Shapes for Tires of Metal Wheels, Dec 1944	A45-319
Concave Shapes for Tires of Metal Wheels, Dec 1944	A45-520
Shapes for Tires of Hay Making Machinery, Wheels, Dec 1944	A45-522
Shapes for Tires of Outside Wheels of Binders, Dec 1944	A45-521
Triplex Steel Plates for Plowshares, June 1944	A36-361
Wood—Wood Fiber for Packing and Sundry Uses, June 1942	B55-001

International Conference Called on Standardization

By Herbert J. Wollner

Standards organizations in nine countries, members of United Nations Standards Coordinating Committee, asked to send representatives to New York, October 8

AT the request of the British Standards Institution, the Canadian Standards Association, and the American Standards Association, which comprise the Executive Committee, the Central Office of the United Nations Standards Coordinating Committee has been instructed to announce a full meeting of the international committee to be held in New York, October 8, 1945.

The Executive Committee after an extensive survey of present conditions in the field of international standardization is of the opinion that the time has now come for constituting the permanent international standards organization. With international recognition of the need for a rapid reinstitution of smoothly flowing world trade, the action of the Executive Committee in calling this meeting is to be interpreted as a step directed towards that end.

Invitations have been sent out to the following:

American Standards Association
Standards Association of Australia
Associação Brasileira de Normas Técnicas
British Standards Institution
Canadian Standards Association
Chinese Standards Committee
Association Française de Normalisation
New Zealand Standards Institute
South African Standards Institution

It is anticipated that representatives from practically all the countries will attend.

Unhampered international trade establishes and cements friendly relations between people. One of the barriers to its fullest development arises from the differing manufacturing practices which exist in the several importing and the exporting countries of the world. To the extent that dimensions and design of equipment, the composition of materials, or methods of testing of one country differ from those of another country, hurdles are presented to the free flow of trade.

The capacity of a buying country to employ the products of a selling country is largely determined by the degree to which the seller's products can be integrated into the buyer's economy. International harmony with respect to standards of manufacture, methods of testing, and use, are prime means for achieving such integration.

Herbert J. Wollner is in charge of the New York office of the United Nations Standards Coordinating Committee.

To this end, the national standardizing bodies intend to achieve a collective harmony and agreement with regard to their respective national, industrial, and commercial standards and intimately relate these to the economy of the whole world. However, they intend that this shall be accompanied without loss to their own authoritative positions in their respective national communities. The national bodies accordingly are not so much concerned with setting up international standards as they are in bringing their own respective national standards into an alignment with those of the rest of the world.

The simplest and most direct way for arriving at these ends is through an international association which provides the facilities for arranging the necessary technical and administrative conferences and commissions, and which in addition assumes the responsibility for world-wide distribution of information on standards.

Abundant evidence exists that the governments of nations are now minded, collectively, to effect an over-all coordination in the total world economy. International harmony in industrial and other standards is essential to this end. The future international association of national standardizing associations, truly reflecting the collective policies of standardizing bodies of the world, will, it is hoped, be able to voice these policies and speak for these associations under the auspices of greatest credibility. The national standardizing bodies intend to implement these policies and achieve the ends in view. * * *

NSC Recommends Postwar Industrial Safety Program

The Committee on Post-War Preparation for Industrial Safety of the National Safety Council, 20 North Wacker Drive, Chicago 6, Illinois has prepared an 11-page report, titled, "Planning for Safety in Industry," for the use of executives and safety directors, public officials, and insurance and other organizations in planning effective methods for the reduction of human suffering and the cutting of economic costs from accidents during and after the war. Key factors of the industrial safety problem during the transition and postwar periods are summarized and recommendations for a workable industrial safety program are outlined. As one of the recommendations of the report, attention is called to the importance of consulting American Standard safety codes for the securing of sound technical information on removing accident hazards.

Delegates Invited to Use ASA Offices

The American Standards Association has invited the national standardizing bodies of the countries attending the meetings of the United Nations Standards Coordinating Committee to make the ASA offices their headquarters while in New York. An invitation has been sent to the delegates to avail themselves of ASA facilities while in this country and to use the offices of the American Standards Association as a place to confer with American business men both before and after the three-day meetings.

ASTM To Develop Tests To Show How Materials Perform In Service

THROUGH its many years of experience in developing standards for laboratory testing of materials, the American Society for Testing Materials has found that additional information frequently is needed to determine accurately how a material will perform in service. Now, therefore, the Society has set up machinery for the development of standard methods of test under simulated service conditions. A new Administrative Committee on Simulated Service Testing, which held its first meeting April 18, is in charge of the program. The ASTM describes the work of the new committee as follows: "To undertake the study, development, and standardization of methods of test of simple or composite materials in actual or simulated service conditions and environment, in so far as performance has a bearing on the properties of the material."

Membership of Committee

The new committee has the following membership:

L. L. Wyman, Research Metallurgist, Research Laboratory, General Electric Company, Schenectady, N. Y., *chairman*
H. O. Boyvey, chief of Development Laboratories, Consolidated Vultee Aircraft Corporation, Vultee Field, Calif.
J. M. Frankland, Chief of Structural Test, Chance Vought Aircraft Division, Stratford, Conn.
W. S. Newton, Captain, Bureau of Ships, U.S. Navy, Washington, D. C.
D. E. Parsons, Chief, Masonry Construction Section, National Bureau of Standards, Washington, D. C.
R. E. Peterson, Manager, Mechanics Division, Westinghouse Electric Corporation, East Pittsburgh, Pa.
S. B. Ritchie, Colonel, Ordnance Department, U.S. Army, Washington, D. C.
R. L. Templin, Assistant Director of Research and Chief Engineer of Tests, Aluminum Company of America, New Kensington, Pa.
E. W. Upham, Chief Metallurgist, Chrysler Corporation, Detroit, Mich.

Four general classes of testing on which recommendations may be made have been agreed upon:

(1) Prediction of performance in service by tests of fundamental material properties.
(2) Prediction of performance in service by approximate simulation of service conditions.
(3) Establishment of orders of merit —spot type test.
(4) Research type on the relationship of fundamental material factors to service performance. (Correlation.)

The specific types of tests which the committee will review include:

(1) Fatigue.
(2) Impact.
(3) Wear.
(4) Seizing and Gauling.
(5) Fretting (Seizing Corrosion).
(6) Erosion.
(7) Erosion-Corrosion.
(8) Hardness.
(9) Creep.
(10) Rupture.
(11) Creep-Rupture.
(12) Corrosion.
(13) Stress-Corrosion.
(14) Multiaxial Stress.
(15) Compatibility.
(16) Environment.
(17) High Altitude Effect.
(18) Protective Coatings.
(19) Forming Characteristics.
(20) Elongation and Its Significance.
(21) Stress-Strain Diagrams.
(22) Vibration Testing.
(23) Tests of Springs.
(24) Tests of Hydraulic Packing.
(25) Flexure.
(26) Pressure Vessels.
(27) Fire Resistance.
(28) Load (Life) Tests of Building Construction.

The Administrative Committee on Simulated Service Testing has very broad powers. Its function is not to do testing but to see that it is done. When it decides that work should be done in a certain field it will make recommendations to existing committees to undertake the work if it comes within the scope of the present committee structure. If it is outside the scope of the present committee structure and the committee feels that the work should be done by ASTM, it will recommend to the Executive Committee that a committee be established to cover the field.

To Help Existing Committees

"It is evident," the ASTM reports, "that part of the work of the committee will be to point out to existing committees of the Society the need here and there for a broader outlook on methods of test and interpretation and evaluation of test methods."

When it comes to the correlation of material test with service performance, the work will involve correlation of ASTM with that of such other societies as the American Society of Mechanical Engineers, the Society of Automotive Engineers, and the recently established Society for Experimental Stress Analysis, the Society declares.

Packaging Engineers Organize; Include Standards in Program

An important objective of the recently organized Industrial Packaging Engineers Association of America is to be the formulation of packaging standards which will incorporate the best methods developed during wartime. The Association will stress the practical side of product protection, Irving J. Stoller, executive secretary, announces.

The Association also plans: (1) To further the application of good engineering practices in the industrial packaging field; (2) to encourage and carry out investigation, research, and interchange of ideas among members and in the field of domestic and export industrial packaging; (3) to promote education and training in the science and practice of package engineering; (4) to arrange for the dispensing of information relating to industrial packaging and for discussion and publication of such data and other contributions; (5) to provide technical facts, data, and standards for the materials to be used for packing and shipping; and (6) to promote the professional and economic welfare of its members.

R. F. Weber, International Harvester Company, is president of the new association; M. H. Allen, Dodge-Chicago Division of Chrysler Corporation, is vice-president; and D. H. Irwin, Sargamo Electric Company, is treasurer. Irving J. Stoller, Bradner Smith & Company, is executive secretary.

Food Standards Committee Considers New Regulations

The Food Standards Committee of the Food and Drug Administration, held its first meeting since the beginning of the war in June. The committee considered recommendations on the following standards:

Amendment of the present definitions and standards of identity for Cheddar, washed curd, and Colby cheeses to require that they be made from pasteurized milk or that they be stored for specified periods before they are marketed.

Adoption of definitions and standards of identity for additional cheeses such as Swiss, brick, Limburger, etc.

Adoption of definitions and standards of identity for various process cheeses and related products, such as cheese foods, cheese spreads, etc.

Adoption of definitions and standards of identity for various foods prepared from corn, such as corn meal, bolted corn meal, degerminated corn meal, corn flour, enriched corn meal, enriched grits, etc.

Postpone 1945 Edition of National Electrical Code

Plans of the Electrical Committee of the National Fire Protection Association for a 1945 edition of the National Electrical Code have been indefinitely postponed in accordance with a ruling of the War Committee on Conventions which denied the application of the committee for a permit to hold a meeting on May 14. This committee serves also as ASA Sectional Committee C1 in charge of the National Electrical Code.

It is expected that the Emergency Committee of the Electrical Committee will adopt as interim amendments code changes considered urgent. Reports of the Article Committees have been circulated and NFPA members have been notified to file comments with Chairman Alvah Small, Underwriters Laboratories, Chicago.

Labels Protect Against Dangerous Chemicals

Labels for protection against dangerous chemicals have been systematized and standardized, the Manufacturing Chemists Association of the United States announces, the principal purpose of the work being to discourage the use of code labels which give the user no information about the products.

As guidance to those using the standards, a manual has been prepared which defines terminology, classifies hazards, and recommends labels for different purposes. The manual urges that labels for hazardous chemicals always include the signal words "danger," "warning," or "caution," to designate the degree of hazard; an affirmative statement of hazard; and precautionary measures covering actions to be followed or avoided.

Industrial Safety Handbook Issued In Revised Edition

Complete revision of The Handbook of Industrial Safety Standards, originally published by the stock casualty insurance industry in 1913, is announced by the National Conservation Bureau, accident-prevention division of the Association of Casualty and Surety Executives.

Revised for the seventh time since its initial publication, the 200-page book consists of 34 chapters and a comprehensive variety of illustrations on many phases of industrial safety, and represents a compilation of generally recognized industrial safety requirements. In addition to chapters outlining safety requirements for specific industrial hazards, the book includes a general discussion of the principles involved in organizing a safety program for industrial plants. Wherever possible, the material in this edition has been drawn from the safety codes adopted as national standards by the American Standards Association, as well as those adopted by the American Society of Mechanical Engineers, governmental and fire underwriters' codes and regulations, and recommendations of engineering and other organizations properly recognized as national authorities. In addition to the specific suggestions given, the book refers the reader to many American Standards and other authoritative documents in the field for more detailed information.

Among the many revised features of the handbook are the addition of a two-page chart, showing personal protective equipment recommended on different types of jobs, and new chapters respectively on industrial dermatitis, scientific accident investigation methods, and prevention of "off-the-job" accidents.

Last revised in 1942, the new edition of The Handbook of Industrial Safety Standards can be obtained in paper cover for 75 cents per copy, and in cloth Fabrikoid binding for $1.00, from the National Conservation Bureau, 60 John Street, New York 7, N. Y.

Dr. Moss Receives Holley Medal

Dr. Sanford A. Moss, consulting engineer of the General Electric Company, has been awarded the 1945 Holley Medal of the American Society of Mechanical Engineers for his work on aircraft engine turbosuperchargers. Without these superchargers there could be no high altitude planes. Dr. Moss is shown here (right) inspecting one of the superchargers with R. G. Standerwick (left), head of General Electric's supercharger engineering division.

Dr. Moss is vice-chairman of the ASA Sectional Committee on Letter Symbols and Abbreviations for Science and Engineering. His letter in reply to criticism of some of the American Standard abbreviations and symbols is published this month in the "Readers Write" column.

International Standard Defines Penicillin for World Use

PENICILLIN, the new drug so important during the past few years, has been made universally usable without fear of misunderstanding or incorrect application, through the establishment of an international unit and an international penicillin working standard, *Science*, announced recently. These standards, established by the permanent Commission on Biological Standardization of the health organization of the League of Nations, make it possible for workers in all parts of the world to use the same basis of dosage, and assure that results obtained in one laboratory or clinic will be comparable with those obtained in every other in all parts of the world.

The action of the Commission is in line with its work on a series of biological standards for antitoxins, vitamins, arsphenamines, insulin, pituitary extract, and the sex hormones, which were established by the Commission during the period between World War I and World War II. Experience showed that with these standard units, the results of research, clinical application, production, and assay, wherever obtained, have become easily and readily comparable.

When penicillin became important during this war, it was recognized that a common standard, providing the means of expressing the potency of penicillin preparations in a uniform and generally accepted system of unit notation in whatever country penicillin may be prepared and used, was supremely urgent. As a result, a conference was held at the apartments of the Royal Society in London, in October, 1944, under the auspices of the permanent Standards Commission of the League of Nations. This conference was attended by delegates from the United States, France, Canada, Australia, and Great Britain, as well as by a number of technical observers from these countries and South Africa and India.

The conference, which was as international as possible under world conditions, recommended that a quantity of pure penicillin sodium salt, provided for the purpose by manufacturers in the United States and Britain, be adopted as international standard; and that it be kept, under conditions ensuring its safety and permanence, at the Institute for Medical Research, London. From this center it will be supplied to the directors of national control centers in other countries.

The conference also recommended that an international penicillin working standard, consisting of a calcium salt of penicillin, shall be established and made available for general distribution. This is to be held at the London Institute and distributed to all who may require it in any country in the world.

The international unit recommended by the conference is defined as the specific penicillin activity contained in 0.6 microgram of the international penicillin standard defined above, and that 2.7 micrograms of the present international penicillin working standard be accepted as containing 1 international unit of penicillin.

"The material results of the conference are important, and their effect on many penicillin problems will be immediate and enduring," *Science* declares. "On more general grounds, too, this meeting of experts was an important occasion. . . . It is a good augury for the future of international cooperation in scientific and medical research that, even in times like these, a conference with some claims to being international can be assembled; and that by friendly discussion and frank expression of individual views, decisions can be reached and agreements freely negotiated to the lasting benefit and the advancement of the best interests of all the peoples of the world."

Eight New Members In ASA

Eight new Company Members joined the American Standards Association last month, in support of the Association's work on national standards. These new companies are:

The Balmar Corporation, Baltimore, Md.
Fairfax Engineering Company, Kansas City, Kansas
Harper-Wyman Company, Chicago, Ill.
Ironrite Ironer Company, Detroit, Mich.
Universal Trading Corporation, New York, N.Y.
Verplex Company, Essex, Conn.

New Books in ASA Library

THE AUTOBIOGRAPHY OF SCIENCE, edited by Forest Ray Moulton and Justus J. Schiffers, Published by Doubleday Doran and Company, Inc., Garden City, N. Y. Price, $4.00.

Associated Contractors Members of Safety Correlating Committee

The Associated General Contractors of America has joined the group of other organizations in charge of the safety work of the American Standards Association, as a member of the Safety Code Correlating Committee. Gerald Griffin, Safety Director, Dravo Corporation of Pittsburgh, is the representative of the Association on the SCCC and Harry J. Kirk, Safety Director of the Association, is his alternate.

The association has been interested in the work of the American Standards Association for many years, and has taken an active part in sectional committees on building and safety standards. It is also represented on the Building Code Correlating Committee.

The Safety Code Correlating Committee makes recommendations to the Standards Council on initiation of new projects for the development of safety standards, on membership of committees, and on the approval of safety standards completed by these committees.

New Standards Under Way For Use in Australian Postwar Building

Realizing the advantages of early availability of specifications for materials and equipment for use in a postwar construction program, the Australian Ministry of Post-War Reconstruction has requested the Standards Association of Australia to develop standards for building materials and equipment. The program is designed to assist the activities of the Commonwealth Housing Commission and the Secondary Industries Commission.

"To have maximum effectiveness in any construction program, standards for materials and equipment should be available in advance of plans for design," a recent issue of the Standards Association of Austra-

lia *Bulletin* states, adding, "this rule holds for post-war housing, although pending the issue of new standards, construction may proceed on the basis of past experience and established knowledge. Under present conditions, which are likely to continue for some time to come, shortage of essential building materials may demand the extensive use of substitutes. Moreover, building on such a large scale as is proposed under Government-sponsored schemes calls for intensive investigation into the possibilities of using new and improved materials, designs, and methods of construction. Such conditions may give rise to a need for many new standard specifications."

Work on housing is under way and a program has been started to aid industries for post-war development, the *Bulletin* reports.

Building Standards Needed for Effective Construction

"To have maximum effectiveness in any construction program, standards for materials and equipment should be available in advance of plans for design. This rule holds for post-war housing, although pending the issue of new standards, construction may proceed on the basis of past experience and established knowledge. Under present conditions, which are likely to continue for some time to come, shortage of essential building materials may demand the extensive use of substitutes. Moreover, building on such a large scale as is proposed under Government-sponsored schemes calls for intensive investigation into the possibilities of using new and improved materials, designs, and methods of construction. Such conditions may give rise to a need for many new standard specifications."

—S.A.A. Bulletin, Standards Association of Australia

New Members on ASA Standards Council

W. A. Anderson, recently appointed Mechanical Superintendent of the U. S. Government Printing Office, has been named alternate representative on the Standards Council for the Printing Office. Mr. Anderson succeeds Alfred Hanson, formerly Mechanical Superintendent of the Office who died last year. M. S. Kantrowitz, Technical Director of the Printing Office, is a member of the Council representing the Office.

J. W. Campbell, outside plane engineer of the American Telephone and Telegraph Company, has been appointed secretary of the Telephone Group and as representative of the Group on the Standards Council of the American Standards Association.

He succeeds the late H. L. Huber, foreign wire relations engineer, American Telephone & Telegraph Company, who served as secretary and representative of the Telephone Group on the ASA Standards Council from October 11, 1927 until his death on January 4, 1945. Mr. Huber also served for many years on ASA sectional committees on the National Electrical Code and the National Electrical Safety Code and also on the ASA Electrical Standards Committee. Mr. Huber was an active member of several committees of the American Institute of Electrical Engineers.

Other changes in the personnel of ASA committees made necessary by Mr. Huber's death will be handled by Mr. Campbell as secretary of the Telephone Group.

Cecil N. Hoagland, chief engineer of the Bullard Company, has been named to act as alternate representative for the National Machine Tool Builders Association on the Standards Council of the American Standards Association for the term ending December 31, 1946, and on the Mechanical Standards Committee of the ASA for the term ending December 31, 1945. Mr. Hoagland is the son of F. O. Hoagland, of the Pratt & Whitney Division, Niles-Bement-Pond Company, who has been a representative of the National Machine Tool Builders Association on the ASA Standards Council for many years, and will serve as his alternate. He succeeds Max E. Lange, engineer of the Warner & Swasey Company.

Rear Admiral Harold B. Sallada, U. S. Navy, who succeeded Rear Admiral DeWitt C. Ramsey as chief of the Bureau of Aeronautics June 1, has been appointed a member of the Standards Council of the American Standards Association. Rear Admiral Sallada succeeds Rear Admiral Ramsey as representative of the U. S. Navy, Bureau of Aeronautics.

Other representatives of the Navy on the Standards Council are: Rear Admiral E. L. Cochrane, chief, Bureau of Ships, and Rear Admiral G. F. Hussey, Jr, chief, Bureau of Ordnance.

Commander Emanual C. Beck, U. S. Navy (retired) will continue as alternate representative on the ASA Standards Council.

Dr. Virgil B. Sease

Dr. Virgil B. Sease, member of the ASA Sectional Committee on Standardization in the Field of Photography and widely recognized for his contributions to the technology of photographic emulsion, has been appointed representative of the Photo Products Department, E. I. duPont de Nemours & Company on the Standards Council. Dr. Sease is technical consultant of the Photo Products Department. This organization is the new member of the Photographic Manufacturers Group, Member Body of the ASA. Carlton D. Ford, development director of the duPont Photo Products Department, will serve as alternate representative in the absence of Dr. Sease.

ASA Standards Activities

American Standards

American Standards Reaffirmed

Chestnut Poles, Specifications and Dimensions, O5.3-1941, Reaffirmed 1945
Douglas Fir Poles, Specifications and Dimensions, O5.6-1941, Reaffirmed 1945
Lodgepole Pine Poles, Specifications and Dimensions, O5.5-1941, Reaffirmed 1945
Northern White Cedar Poles, Specifications and Dimensions, O5.1-1941, Reaffirmed 1945
Southern Pine Poles, Specifications and Dimensions, O5.4-1941, Reaffirmed 1945
Ultimate Fiber Stresses of Wood Poles, 05a-1933, Reaffirmed 1945
Western Red Cedar Poles, Specifications and Dimensions, O5.2-1941, Reaffirmed 1945
Sponsor: ASA Telephone Group
Relays Associated with Power Switchgear, C37.1-1937, Reaffirmed 1945
Sponsor: Electrical Standards Committee

Standards Being Considered by ASA for Approval

Pipe Threads, Revision of B2.1-1942
Sponsors: American Gas Association; American Society of Mechanical Engineers

Standards Submitted for Approval

Practice for Inspection of Elevators, Inspectors' Manual (Revision of A17.2-1937)
Sponsors: National Bureau of Standards; The American Institute of Architects; The American Society of Mechanical Engineers
Basis for the Coordination of Dimensions of Building Materials and Equipment, A62.1
Basis for the Coordination of Masonry, A62.2
Sponsors: The American Institute of Architects; The Producers' Council, Inc

New Project Requested

Refrigeration Nomenclature (Requested by The American Society of Refrigerating Engineers)

American War Standards

American War Standards Approved Since Our July Issue

Chemical-Resistant Gloves, L18.29-1945
Linemen's Rubber Protective Equipment, Specifications for, J6
- Rubber Insulating Line Hose, J6.1-1945
- Rubber Insulator Hoods, J6.2-1945
- Leather Protector Gloves, J6.3-1945
- Rubber Insulating Blankets, J6.4-1945
- Rubber Sleeves, J6.5-1945

American War Standards—(Continued)

Photography and Cinematography, Z52
- Contact Printer, Photographic, Specification for, Z52.18-1945
- Projection Screens (Mounted on Spring Rollers), Specification for, Z52.56-1945

Safety Color Code for Marking Physical Hazards and the Identification of Certain Equipment, Z53.1-1945

War Standards Under Way

Cylindrical Fits, B4.1
Manual of Standard Drawing Practice, Z14
- Section C, General Drawing Practice
  - Subsection 1. Projection
  - Subsection 2. Line Conventions
  - Subsection 3. Sections & Sectioning
  - Subsection 4. Scales
  - Subsection 5. Lettering

Machine Tool Electrical Standards (Revision of C74-1942)
Photography and Cinematography, Z52
Motion Picture Cameras
- Distance Calibration of 16-Mm Motion Picture Camera Lenses, Z52.51
- Field of View of 16-Mm Motion Picture Camera View Finders Having Parallax Adjustment, Z52.49
- Mounting Dimensions for 16-Mm Camera and Recorder Film Magazines (400-Foot Gear-Driven Type), Z52.52
- Mounting Dimensions for 16-Mm Camera and Recorder Magazines (200-Foot Belt-Driven Type), Z52.66
- Mounting Dimensions for 16-Mm Camera and Recorder Magazines (400-Foot Belt-Driven Type), Z52.67
- Photographing Aperture of 16-Mm Sound Motion Picture Cameras, Z52.47
- Photographing Aperture of 16-Mm Silent Motion Picture Cameras, Z52.48
- Registration Distance and Mounting Dimensions of 16-Mm Motion Picture Camera Lenses, Z52.50

Motion Picture Projection Equipment
- Class II Service Model 16-Mm Sound Motion Picture Projection Equipment, Specification for, Z52.13
- Projection Screens (Folding, for Portable-Frame Mounting), Z52.58
- Projection Screens (Auditorium-Frame Mounting), Z52.59
- Projection Screens, Sizes of (Proposed Revision of Z52.41-1945)

Motion Picture Release Prints
- Leaders, Cues, and Trailers for 16-Mm Sound Motion Picture Release Prints Processed from Original 16-Mm Material, Z52.31
- Picture and Sound Synchronization Marks for 35-Mm and 16-Mm Sound Motion Picture Release Negatives and Other Preprint Material, Z52.53
- Printer Loss in 16-Mm Sound Motion Picture Prints, Method of Determining, Z52.40

Motion Picture Test Films
- Warble Test Film Used for Testing 16-Mm Sound Motion Picture Equipment, Specification for, Z52.32

Photographic Filter
- Terminology and Nomenclature, Z52.61

Still Cameras
- Exposure Markings for Between-the-Lens Shutters, Z52.62
- Exposure Markings for Focal Plane Shutters, Z52.64

War Standards Under Way—(Continued)

Photography—(Continued)
- Exposure Time of Focal Plane Shutters, Method of Determining, Z52.65
- Performance Characteristics of Between-the-Lens Shutters, Method of Determining, Z52.63

Still Printing Equipment
- Enlarger, Photographic, Specification for, Z52.23

Radio Noise, Methods of Measuring, C63
Safety Code for the Industrial Use of X-Rays
- Electrical Protection, Part VI
- Methods and Materials of X-Ray Protection, Part III
- Specific Applications for 400 Kv and Lower, Part IV
- Specific Applications of One and Two Million, Part V
- Use and Storage of Radium in the Field of Industrial Radiography, Part II

Screw Threads, B1
- Buttress Threads
- High-Duty Studs in Light Alloys
- Instrument Threads
- Stub Acme Threads
- Unification of Screw Threads

Women's Industrial Clothing
- Jackets for Outdoor Wear (Slide-fastener Closure), L17.6
- Jackets for Outdoor Wear (Fly-type Button Closure), L17.5

News of ASA Projects

Definitions and Quantities Used in Underwater Sound Measurements—

Standardization of the various quantities used in defining the performance of underwater sound projectors and hydrophones has been recommended by the Hydrophone Advisory Committee to the Bureau of Ships, U.S. Navy Department, and have been referred to the ASA Sectional Committee on Acoustical Measurements and Terminology, Z24. The following have been suggested for adoption as standards:

(*a*) 1 dyne per sq cm, as a reference level for underwater sound measurements

(*b*) 1 meter, as the unit of distance in underwater sound calibration work

Method of Compiling Industrial Injury Rates, Z16.1—

Sponsors: International Association of Industrial Accident Boards & Commissions; National Council on Compensation Insurance; National Safety Council.

A revision of the 1937 edition of this standard has been completed by the sectional committee and was discussed at a meeting of the Executive Committee of the Safety Code Correlating Committee August 8.

Safety Code for Rubber Mills and Calenders, B28a-1927—

Sponsors: International Association of Industrial Accident Boards and Commissions; National Safety Council.

In the opinion of the sponsors, this 1927 standard should now be revised and amplified in light of new developments in the rubber industry, particularly in the manufacture of synthetic rubber. Ventilation and static control should be given special consideration in such a safety standard, they believe.

Safety in the Industrial Use of X-Ray, Z54—

Following a meeting of the War Committee on July 19 draft standards on additional parts of the project on x-rays have been prepared and are being circulated for comment. Part IV on Specific Applications of 400-Kv and Lower and Part VI on Electrical Protection, which are intended to be of use during the war, have already been sent out. Drafts on Radium, Part II, and on Methods and Materials of X-Ray Protection, Part III, and Specific Applications of One and Two Million (Part V) will be circulated soon. American War Standard Safety Code for the Industrial Use of X-Rays, Part I, Z54.1-1945, covering general protection, has already been approved by the American Standards Association.

Textile Safety Code, L1-1929—

Sponsor: National Safety Council.

A revision of the 1929 edition of this safety standard is now being considered by the sectional committee.

In addition to its work on the proposed revision, the committee has been asked to comment on proposed regulations relating to textile machinery prepared by the International Labour Office. These proposed regulations were prepared by an ILO committee on accident prevention that is now working on a code recommending basic principles of factory safety for use by industries desiring to rebuild factories in devastated areas.

Women's Industrial Clothing, L17—

This ASA War Committee, which is now working on women's outdoor garments to wear over the indoor garments formerly completed, held a meeting August 1 and considered draft standards for two women's jackets for outdoor wear. One has a fly-type button closure and the other has a slide-fastener closure. The main feature of both jackets is a gusset under the arm to permit completely free action. Both also have removable linings which are buttoned in but which can easily be made with slide fasteners when these become available for general use. The two drafts are now being prepared to send to the committee for letter ballot.

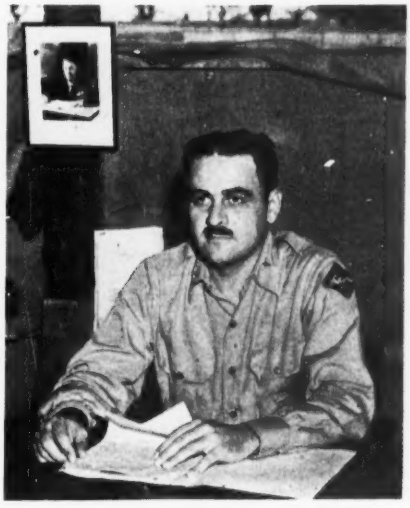
Lt Colonel Sydney K. Wolf Receives Legion of Merit Award

THE Legion of Merit, the nation's fourth highest award, has just been presented to Lieutenant Colonel Sydney K. Wolf, Chief of Operations Analysis Sections of General George C. Kenney's Far East Air Forces. Colonel Wolf is chairman of the ASA War Committee on Radio, C75. At the time the American War Standards for radio components were being developed, he was Assistant Director for Production, Radio and Radar Division, War Production Board, and worked closely and effectively on the standards program.

The Legion of Merit was presented to Colonel Wolf for exceptional meritorious conduct in the performance of outstanding services in the Southwest Pacific.

As chief of an Operations Analysis Section of the Fifth Air Force, and later as chief of two combined Operations Analysis Sections of the Far East Air Forces, Colonel Wolf supervised scientific research on a variety of Air Force problems.

"Under his direction," the citation declares, "quantities of data were collected and analyzed in radar control measures, bombing accuracy and effectiveness, battle damage due to hostile operations and antiaircraft fire, meteorology, personnel, and training. The establishment by his analysts of effective radar operating procedures and of higher standards of maintenance prevented much damage to our installations on Morotai and in the Philippines. His analyses of bombing accuracy, and his instruction in bomb and fuse selection, assisted in planning heavily destructive strikes against enemy installations. The many significant contributions to Air Force operating efficiency made by the Operations Analysis Sections in the Southwest Pacific Area are, in a high degree, due to the outstanding ability, professional skill, and scientific perception demonstrated by Colonel Wolf."



Lieutenant Colonel S. K. Wolf

Colonel Wolf recently completed a round-the-world trip studying operations and analysis activities in all operational air forces, and recruiting operations-analysis personnel from the European theater, for an extension of his activities in the then expected assault on Japan.

25 Years of Standards In the Petroleum Industry

In an article entitled, "Twenty-five Years of Work Developing Test Methods for Petroleum Products," in a recent issue of the American Petroleum Institute *Quarterly*, David V. Stroop, API staff engineer, recently appointed Acting Secretary of the American Society for Testing Materials Committee D-2, outlines the history of the development of standard methods of test and specifications for petroleum products.

The early history of the petroleum industry, before the formation of Committee D-2, was similar to conditions existing in many other industries, with all shades of opinions and thoughts on standards, Mr. Stroop declares. There was, however, a realization of the importance of having recognized standards, he states.

ASTM organized its Committee D-2 on Methods of Testing Lubricants in 1904 and numerous proposed methods were developed, but it was not until 1917 that the various methods were agreed on and published. In 1920 ASTM enlarged the scope of this committee to include tests for all petroleum products, the original scope having covered only standard tests for lubricants.

Ninety-three standard methods of test and specifications of the ASTM have been adopted as API standards. Ninety-one have been approved also as American Standards. The standards are divided into groups covering petroleum products, oil-field production equipment, and oil-refining and oil-marketing equipment.

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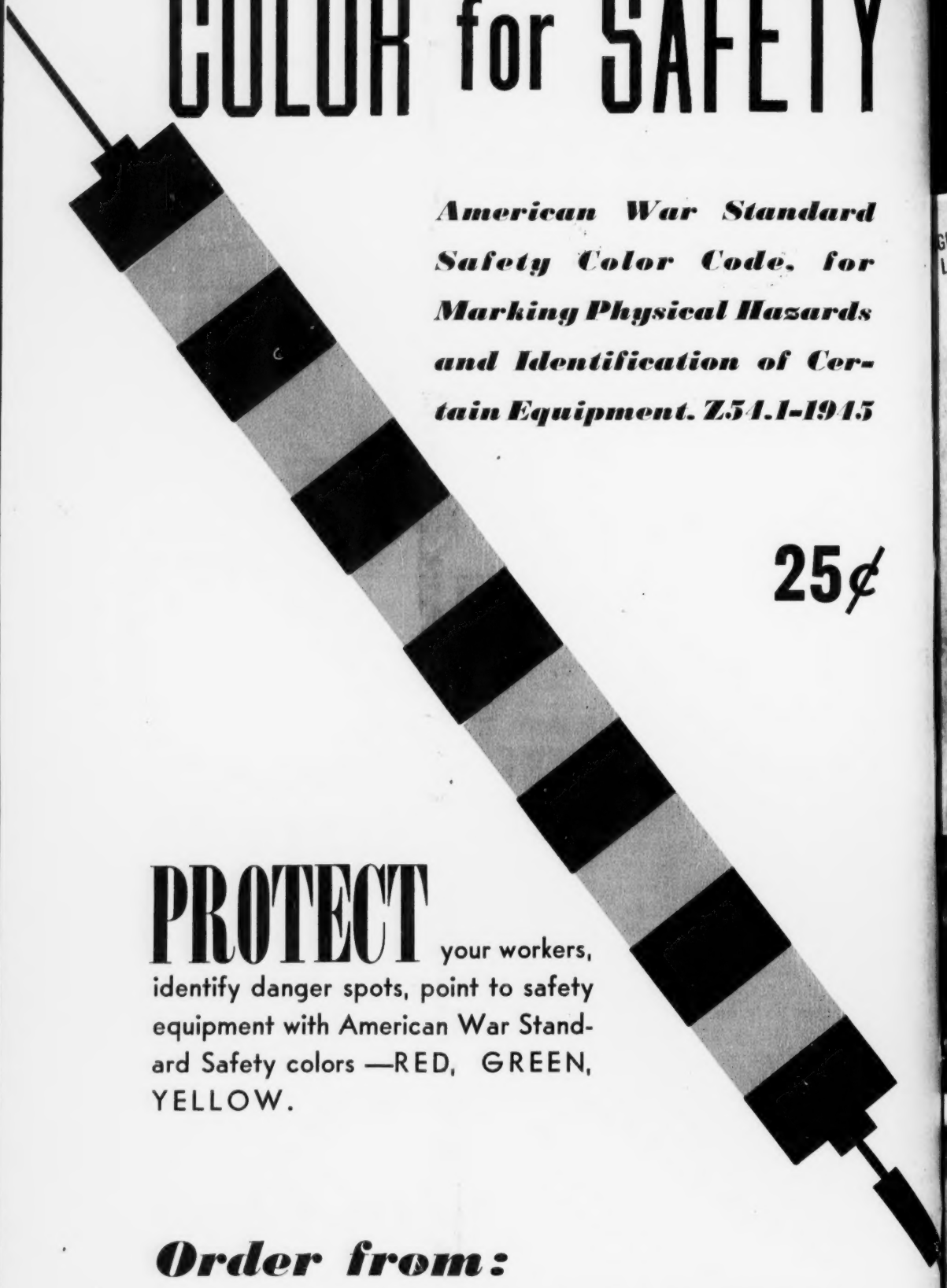

American War Standard Safety Color Code, for Marking Physical Hazards and Identification of Certain Equipment. Z54.1-1945

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PROTECT your workers, identify danger spots, point to safety equipment with American War Standard Safety colors —RED, GREEN, YELLOW.

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